Deliverable D7.7
Experimental Approaches in Civic Participation.
Lessons learnt 1

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ABBREVIATIONS

Abbreviation	Full name
AI	Artificial Intelligence
D	Deliverable
EU	European Union
KPIs	Key Performance Indicators
STPs	Social Tipping and Leverage points
T	Task
WP	Work Package

EXECUTIVE SUMMARY

Under the utilisation of a hybrid human-AI decision support ecosystem, the NEUROCLIMA project, which is funded under Horizon Europe, intends to encourage systemic change in the direction of climate resilience. This ecosystem stimulates individuals, policymakers, and public institutions to engage in a conversation that goes in both directions, with the priority being placed on trust, openness, and inclusivity. The project NEUROCLIMA also ensures that the hybrid human-AI decision support ecosystem is inclusive, transparent, and trusted by diverse stakeholders through civic participation. This report on experimental methods for civic involvement-Deliverable D7.7-offers the bedrock for subsequent pilot testing and full-scale deployment that ensures systemic change towards climate resilience. These approaches will be the driving force behind future pilot testing and large-scale deployment.

This deliverable provides an overview of novel approaches and frameworks that can be utilised to involve stakeholders in climate adaptation activities. The presented research investigates artificial intelligence-driven participatory methodologies and creative engagement tools, while simultaneously linking theoretical findings with practical, real-world applications. Included among the primary goals are:

- Developing experimental ways to employ artificial intelligence (AI) tools and participatory approaches.
- Establishing success criteria for trust, accessibility, and inclusivity in regard to the project.
- Anticipating risks and obstacles and determining solutions to help mitigate them.
- Providing recommendations to guarantee effective impact, scalability, and confidence among stakeholders.

The Framework for Pilot Testing

The pilot activities are an integral part of the NEUROCLIMA project, providing real cases for validating and improving methodologies and tools presented in Deliverables D2.2 and D2.3 and developed through WP3, WP4 and WP5. Pilots will test the feasibility, functional performance, and overall effectiveness of new approaches for stakeholder engagement, civic participation, and climate resilience.

1. Pilot 1: "Capitalising upon social tipping and leverage points for behavioural change towards climate change adaptation"— AI Monitoring Tool Testing.

- Journalists, content creators, and policymakers are the audiences that are targeted.
- Evaluation of the functionality, usability, and operational efficiency of the instrument in different real-world applications is the primary focus.
- System accuracy, reaction time, user happiness, and retention rates are the metrics that are being measured.

2. Pilot 2: "Cultivating climate literacy and informing citizens about the impact of initiatives for the green transition through blended learning experiences and creative expression for the implementation of climate change adaptation" — Literacy in Climate Change and Participatory Engagement.

- Educators, students, youth groups, and citizens are the many users that are targeted.
- Activities include integrating gamification and interactive storytelling in conjunction with blended learning; participatory design workshops that make use of creative media.

- Metrics include indices of inclusion, creative outputs, participation rates, the retention of previously acquired knowledge and behavioural change.

Surveys, focus groups, usability testing, and observational studies are all examples of methodological approaches to evaluation. The incremental changes that can be made to improve pilot performance will be informed by both quantitative and qualitative data.

Criteria for achieving success

Surveys, focus groups, usability testing, and observational studies will provide both quantitative and qualitative data. Insights from real-world applications will inform refinements, ensuring tools are optimized for technical performance and user experience to evaluate the effectiveness of the pilot.

Non-Functional Criteria for Success:

- The accessibility of tools and activities requires that they be user-friendly, accommodating a wide range of user requirements, and devoid of any technical obstacles.
- Inclusivity refers to the equitable representation of varied stakeholders across demographic spectrums, with the goal of ensuring that cultural and individual distinctions are valued.
- Transparency refers to procedures, dependable technologies, and safe data management are all essential components of trust, which helps to cultivate participant confidence and involvement.

Functional Criteria for Success:

- **Accuracy & Precision** refers to the precision, reliability, and consistency of tools and activities in delivering meaningful and error-free results.
- **Operational Efficiency** refers to system responsiveness, uptime, failure recovery rates, and overall processing effectiveness.
- **Impact & Effectiveness** which extends to learning tools increase climate literacy, drive participation, and encourage sustained engagement.

Balancing Non-Functional and Functional Requirements

While non-functional criteria such as accessibility, inclusivity, transparency, and trust are essential for fostering meaningful civic participation, they are not the only requirements necessary for the success of the pilot phase. To achieve a successful pilot test, it is crucial to combine these criteria with a range of other key performance indicators (KPIs) that ensure the overall effectiveness and impact of the tools and methodologies. In the case of NEUROCLIMA, the consortium has established numerous additional KPIs that will be used to evaluate the success of the pilot. These KPIs encompass various functional and operational aspects that are integral to meeting the project's broader objectives. By addressing both non-functional and functional requirements, the pilot aims to deliver comprehensive and impactful outcomes that align with the goals of the NEUROCLIMA initiative.

Challenges that are anticipated and strategies for mitigation

The problems that are expected to be found during the pilot testing of NEUROCLIMA are related to several identified risks and mitigation strategies in D1.7 - Legal and Ethical Issues Manual and D1.9 - Risk Management Plan. How these are expected to become relevant is as follows:

Technical Barriers

- From D1.9: Identified risks include delays in administrative procedures and gaps in quality, such as technical defects or integration problems. Mitigation involves proactive monitoring and resource allocation.
- From D1.7: Data protection compliance and AI system accuracy concerns underpin the need for robust testing during development phases.

User Engagement Challenges

- From D1.9: There were also risks identified related to a lack of communication or stakeholder buy-in. This could be mitigated through clear communication, gamification, and regular feedback.
- From D1.7: Ethical guidelines on behavioral change interventions emphasize transparency and participatory design to uphold trust and engagement.

Financial Constraints

- From D1.9: Resource constraints were advised to be managed by prioritizing high-impact activities along with budget monitoring.

Communication Gaps

- From D1.9: It was proposed to reduce coordination risks by establishing structured communication channels and regular meetings.
- From D1.7: Principles of transparency under GDPR emphasize clear communication with participants to avoid misunderstandings and concerns.

Recommendations for the Implementation of Future Measures

The deliverable suggests the following in order to assist the more general goals of NEUROCLIMA:

- Increasing the ease of use of the platform through iterative feedback, user-friendly design, and the implementation of assistive technology to promote inclusivity.
- Increasing the level of stakeholder engagement through the implementation of co-creation processes, individualised outreach, and trust-building approaches.
- Continuous refining using measurable key performance indicators (KPIs) is used to evaluate tools for scalability. This ensures that tools are adaptable and effective in a variety of scenarios.
- Regarding the Most Important Success Criteria: When it comes to the design and execution of tools, accessibility, accuracy, inclusivity, and trust should be given priority.
- Scaling from Pilot to Full Implementation: Conducting systematic testing in a variety of scenarios to ensure it is applicable to a wide range of situations and has an impact in the real world.

In summary

By establishing a complete path for experimental civic engagement strategies inside NEUROCLIMA, Deliverable D7.7 is designed to fulfil its purpose. In order to promote active public participation and collaboration with institutions in order to co-create solutions for climate resilience, the initiative places an emphasis on inclusivity, accessibility, and trust. The ideas and methods for pilot testing that are provided in this document provide a solid foundation for expanding the use of NEUROCLIMA tools and furthering climate adaptation techniques.

1. Introduction

The NEUROCLIMA project stands at the crossroad of advanced research, innovative technology, and comprehensive civic engagement within socio-technical and decision-support systems. Its main objective is to address the multidimensional challenges posed by climate change through the integration of participatory methods, blended learning tools, and innovative technological solutions. The **participatory design framework**, **playful experiences,** and **toolkits** that offer hands-on activities in several formats-from digital and performing arts up to the facilitation of physical and digital discourses-are part of it. The innovations include an interactive storytelling platform, an AI-driven content recommender, and a learning management system for creating and consuming enriched learning experiences

NEUROCLIMA is dedicated to **empowering** both **citizens and institutions** alike. This empowerment aims to facilitate collaborative efforts in the co-creation of innovative solutions that significantly enhance climate resilience across various communities and sectors. In this context, Deliverable D7.7: Experimental Approaches in Civic Participation plays a role in informing the design process of actionable frameworks to promote and foster active civic participation among the EU population.

NEUROCLIMA's AI-powered "nervous system," will enable two-way communication among citizens, policymakers, and other institutions. The concept is in line with prior studies that have made it quite clear that technological tools, when thoughtfully integrated into the complex processes of civic engagement, can serve to effectively enhance trust, substantially improve participation, and encourage sound evidence-based decision-making (Fung, 2006; Schuler, 2010).

The primary objective of D7.7 is to develop and test experimental approaches that promote civic involvement while simultaneously addressing important aspects such as trustworthiness, accessibility, and inclusion. Arnstein (1969) and Carpentier (2016) both agree that these principles are necessary in order to guarantee that the tools and strategies that are developed will resonate with a wide variety of stakeholder groups and will be able to overcome traditional barriers to engagement. Participatory storytelling and gamification, for example, have been proven to dramatically boost engagement, information retention, and collaborative decision-making, particularly in educational and climate adaptation contexts (Gee, 2008; Green & Jenkins, 2014). These findings have been drawn from research that has been conducted within WP2 & WP3 tasks and activities of NEUROCLIMA project .

The purpose of this report is to bridge the gap between preliminary research and pilot implementation by utilising theoretical insights gained from previous NEUROCLIMA deliverables, such as D2.1 (theoretical models) and D2.3 (pilot needs).

The following are some of the highlights of D7.7:

- **Experimental Methodologies**: The elaboration of an innovative tool for civic engagement is foreseen, building further and developing ideas put forward so far-for example, artificial intelligence-powered monitoring systems-but also more interactive, such as storytelling online platforms and/or narrative-led methodologies that will allow scaling up with greater intensity and ensure supplementation of those proposed under the blended learning tools-participatory frameworks described previously.
- **The Metrics of Success**: The establishment of trust, accessibility, and inclusion as primary evaluation criteria, as well as the development of rigorous evaluation frameworks for the purpose of evaluating pilot results.

- **Identification of** potential technical, financial, and engagement **obstacles,** as well as the provision of solutions to overcome those challenges, are examples of risk mitigation strategies.

Through piloting activities that place an emphasis on feedback-driven changes, the preparatory phase that is detailed in D7.7 strives to improve the tools and methods that are being used. The NEUROCLIMA framework ensures that methods for civic engagement are both **evidence-based** and **adaptable to real-world circumstances**. It does this by drawing on proven frameworks such as the Democracy Cube (Fung, 2006) and participatory design principles (Bjorgvinsson et al., 2010).

In conclusion, Deliverable D7.7 **lays the groundwork for the future pilot testing phase** (WP6), which helps to support the overarching objectives of the NEUROCLIMA project. This deliverable contributes to the creation of a repeatable model for climate resilience that empowers citizens as well as institutions. This is accomplished by matching theoretical insights with practical implementation.

2.   Pilot Testing Overview

2.1.   The pilots

The pilot testing phase for NEUROCLIMA will implement innovative strategies aimed at engaging key stakeholders, namely journalists, content creators, policymakers, educators, students and citizens, to promote and facilitate climate literacy, and to encourage participation in climate adaptation initiatives.

Two distinct pilots will be executed:

- Pilot 1, which will focus on the application of **AI monitoring tools**, with journalists, content creators, and policymakers as users. The main objectives of this pilot include assessing the AI tools' functionality, usability, accessibility, and adequacy to users' needs.
- Pilot 2, which will aim at fostering climate literacy and civic engagement through 1) **blended learning**, exploring the integration of gamification and interactive storytelling to help educators to tutor students on climate adaptation strategies, and 2) **participatory design**, using creative media, such as writing and cinematography, to engage youth groups and citizens in general in workshops, to foster collaboration and investment in climate-related decision-making processes.

2.2.   Objectives and Methods

The pilot phase will transform the theoretical frameworks and preparatory research from previous steps into practical application. During the pilot implementation, there will be a strong emphasis on the evaluation of the tools developed and on identifying possible challenges, in order to perform the necessary refinements before full-scale implementation and achieve the ultimate outcomes of enhancing climate literacy and civic engagement.

To reach these objectives, a mix of qualitative and quantitative methods will be employed:

- For AI Monitoring Tool testing, in which journalists, content creators, and policymakers will use the tool in real-time scenarios (Pilot 1), users will provide practical **feedback** on its operational efficiency, ease of use, and relevance.

- For in-person workshops and interactive sessions activities that will support blended learning and **participatory approaches** (Pilot 2), there will be an **evaluation of participant engagement and knowledge retention**.
- For all activities, **surveys, questionnaires and focus groups** can be used to gather insights from participants.

All feedback will help in refining strategies and pinpoint areas for improvement.

2.3. Link to Literature

The pilot testing phase draws on theoretical insights and empirical evidence detailed in Deliverables D2.1 and D2.2 and supports the user and pilot requirements defined in Deliverable D2.3. The concepts of **social tipping and leverage points** (STPs and SLPs), which emphasize identifying moments of change to drive systemic adaptation, serve as a foundation for the participatory approaches and tools being tested.

Previous studies on evaluating AI systems emphasize the importance of precision, user interaction, and operational efficiency (Ta et al., 2024; see also section 6.4 of D2.1). These metrics directly inform the testing and iterative refinement processes of Pilot 1. Furthermore, research has also highlighted the potential of gamification and storytelling to enhance engagement, knowledge retention, and learning outcomes, particularly in educational environments (reference list in D2.1). These insights underpin the design of Pilot 2's use cases.

2.4. The pre-pilot activities of D7.7

The present Deliverable, D7.7, further supports the pilot testing phase by offering structured guidance and actionable recommendations. It bridges the gap between preparatory activities and practical application by:

- Envisioning methodologies for assessing tools and activities for civic engagement and guaranteeing alignment with the project's objectives.
- Establishing success metrics such as accessibility, inclusivity, and trust.
- Anticipating risks and challenges for the pilot phase.
- Offering recommendations for iterative improvement, ensuring tools and methods remain adapted to stakeholder needs throughout the pilot phase.

2.5. Understanding the needs of the Pilot Implementation

During the preparation phase of Deliverable D7.7, the pilot testing implementation partners (WP6 leaders) were approached in order to gather their feedback and expectations regarding several critical aspects of the implementation of the pilots. This collaborative effort focused on understanding their views on the expectations for the pilot phase (→ Annex 1), potential concerns, anticipated challenges (→ Annex 2), risks, success metrics, evaluation criteria (→ Annex 3), and any suggestions they could provide to enhance the pilot's effectiveness.

Through an open invitation for participation, an online excel form was created and partners were encouraged to share their insights, which were systematically recorded and analyzed throughout the D7.7. The feedback collected during these sessions was instrumental in shaping the following chapters of this deliverable, ensuring they accurately reflect the shared priorities, concerns, and success criteria outlined by the partners.

3.   Envisioned Experimental Methods for Civic Engagement

3.1.   Bridging Civic Engagement and Climate Adaptation

Civic engagement is a cornerstone of climate change adaptation, empowering citizens to take ownership of local solutions and fostering trust between communities and institutions. Despite its importance, civic engagement often remains fragmented, top-down, and inaccessible, contributing to apathy, low literacy, and limited involvement in climate actions (Cattino and Reckien, 2021). This Chapter of D7.7, will try to address these challenges by testing innovative, experimental approaches grounded in participatory models and AI-driven tools. This phase serves as a preparatory step to:

- Test and validate inclusive, experimental methods for engaging diverse groups.
- Bridge theoretical models (e.g., Arnstein's Ladder, Fung's Democracy Cube) with practical applications.
- Incorporate AI solutions to enhance accessibility, transparency, and data-driven decision-making.

By refining these methods in controlled, small-scale environments, NEUROCLIMA ensures readiness for large-scale pilot implementation while learning from initial successes and challenges.

3.2.   Theoretical Foundations and Participatory Frameworks

The envisioned experimental methods are informed by established civic participation frameworks that address inclusivity, power dynamics, and decision-making processes:

Arnstein's Ladder of Citizen Participation (1969): This model categorises engagement levels into non-participation, tokenism, and citizen power, emphasizing the need to move from consultation to empowerment.

Figure 1. French Student Poster from Arnstein's Ladder of Citizen Participation (1969)- This figure is a humoristic representation of the criticism of participatory processes showing different levels of participation. However, a distinction is made between symbolic participation ("je participe") and the real empowerment of the people ("ils profitent"). The latter figure applies to Arnstein's scheme by underlining that the movement should go from tokenistic participation to citizen power over decisions.

Fung's Democracy Cube (2006):

- Who Participates: From expert administrators to randomly selected citizens.

- How Participants Communicate: Deliberative forums, creative workshops, or adversarial debates.
- Link to Decisions: Advisory roles to full decision-making authority. This multidimensional model ensures inclusivity and adaptability.
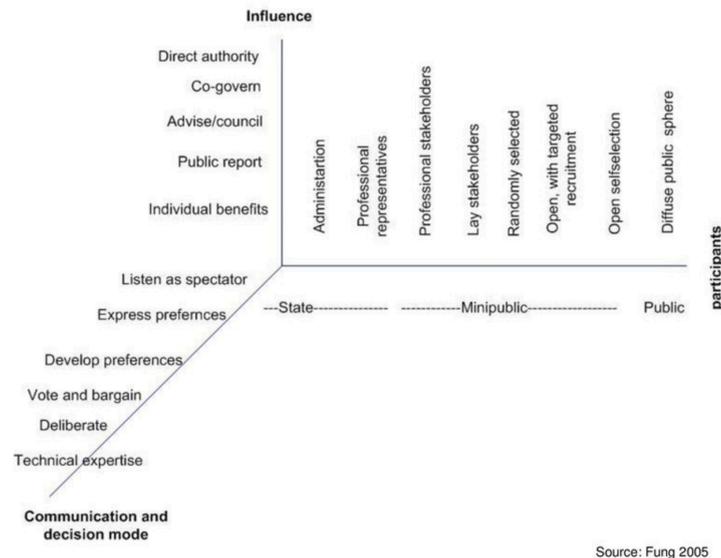

Figure 2. The democracy cube as introduced by Archon Fung (2006).

Asset-Based Community Development and **Deliberative Democracy** were specifically selected because of the complementary approaches in fostering meaningful civic participation and driving impactful community-led change.

- **Asset-Based Community Development (ABCD)**: This framework was chosen because it shifts the focus from deficiencies to inherent strengths and resources within communities, such as social networks, natural assets, and financial capital. This aligns with NEUROCLIMA's goal of empowering stakeholders to collaboratively co-design climate resilience solutions tailored to their unique contexts, ensuring sustainability and local ownership.
- **Deliberative Democracy:** Complementing ABCD, this framework emphasizes the need for informed and structured dialogues-such as citizen juries and focus groups-in order to embed diverse public perspectives in policy-making. Its focus on fairness, transparency, and inclusivity makes it a critical tool for fostering trust and ensuring that decisions are equitable and representative of the communities affected.

By bringing these two frameworks together, NEUROCLIMA secures the basis for engagement strategies that are at once participatory and rooted in local capacities, while being informed by rigorous, inclusive dialogue processes. This dual focus ensures methodologies that are robust, equitable, and capable of addressing complex challenges for climate resilience.

3.3.   Experimental Methods Examples

The experimental methodologies of the NEUROCLIMA project denote a set of innovative and iterative processes by which to test and refine a suite of tools, processes, and engagement strategies to build climate resilience. These will be underpinned by participatory design frameworks, blended learning tools, and creative methodologies informed by theoretically informed models-such as **Asset-Based Community Development** and **Deliberative Democracy**-but also pragmatic, applied instances

Table 1. The experimental methodologies of the NEUROCLIMA project.

Section	Purpose/Objective	Method	Tools	Expected Result
Scenario-Based Participatory Design	Facilitate community co-creation of adaptation strategies via interactive, real-world scenarios (e.g., flood mitigation, heatwave solutions).	• Workshops with illustrated scenarios (e.g., digital tools or role-playing). • Collaborative brainstorming to identify priorities, constraints, and solutions. • Feedback collected via surveys and focus groups.	• Digital scenario tools (e.g., Miro, StoryMap). • Survey software (e.g., Google Forms, SurveyMonkey). • Focus group recording and transcription tools.	Enhanced local ownership of adaptation strategies and practical understanding of context-specific requirements.
Gamification and Role-Playing Exercises	Augment engagement, climate literacy, and pro-environmental behaviour via interactive learning.	• Gamified simulations (e.g., AI-driven games) addressing climate challenges like carbon budgeting or resource management. • Role-playing exercises to replicate decision-making processes (e.g., policymakers, activists).	AI-powered dashboards for monitoring progress and engagement.	Enhanced climate literacy, behavioural modifications, and heightened motivation among youth and educators.
Creative Expression Platforms	Utilise narrative, artistic expression, and innovative media to engage citizens emotionally and intellectually with climate-related concerns.	• Community storytelling workshops to create films, narratives, or artworks. • Public exhibitions or digital platforms to display outputs and enhance awareness. • Feedback via interviews and participatory discussions.	• Creative software (e.g., Adobe Creative Suite, Canva). • Exhibition platforms (e.g., YouTube, local gallery spaces). • Discussion tools (e.g., Slack, Padlet).	Enhanced emotional engagement with climate adaptation, fortified community networks, and localised advocacy.

Citizen Science and Participatory Cartography	Involve citizens in the collection of environmental data and spatial mapping to facilitate evidence-based decision-making.	• Use of mobile applications and mapping tools to document environmental changes (e.g., pollution levels, flooding hotspots). • Collaborative data analysis sessions for result interpretation and solutions suggestion.	AI-driven predictive modelling to visualise trends and anticipate outcomes.	Augmented data ownership, refined local decision-making, and heightened community agency.
Multi-Channel Digital Engagement Platforms	Integrate face-to-face engagements with digital platforms to ensure inclusivity among diverse demographics.	• Virtual platforms for remote participants to exchange ideas and feedback. • Real-time AI sentiment analysis for engagement assessment. • Support for multiple languages and accessibility features (e.g., voice commands).	• Virtual meeting tools (e.g., Zoom, Microsoft Teams). • AI sentiment tools (e.g., MonkeyLearn, IBM Watson). • Accessibility features (e.g., Otter.ai for transcription).	Increased participation, inclusion of marginalised groups, and improved transparency.

1.1.1. Scenario-Based Participatory Design

Purpose

Allow community-led co-design of adaptation options through participatory scenario planning on, for instance, flood mitigation or responses to heatwaves.

Approach

Workshop participants engage with scenarios through, for instance, digital model simulations or interactive mapping or role-playing.

- Example: Flood Resilience Planning workshops that incorporate GIS based tools to model and visualize flood risks (Beven et al., 2014).

Collaborative brainstorming is done to set out priorities, constraints, and plausible solutions for the community.

- Example: The Adaptive Pathways Framework of Haasnoot et al. (2013) to find flexible strategies for an uncertain future.

Feedback of perceived effectiveness from stakeholders by using structured surveys, focus groups, or post-workshop questionnaires refines methodologies.

- Example: Participatory scenario planning for drought adaptation in Africa by Dougill et al. 2016.

Tools

Digital Tools for Scenario Development
- *StoryMap* by ESRI: Interactive storytelling of spatial and non-spatial scenarios
- *SimCityEDU*: Simulations to understand challenges of urban development.
- *NetLogo*: Agent-based modeling software for participatory scenario analysis in a collaborative way.

Brainstorming and Collaboration Tools
- *Miro or MURAL*: Visual collaboration platform to work with remote and/or co-located teams.
- *Google Jamboard:* An easy-to-use brainstorming device for group ideation.

Feedback Collection Tools
- *SurveyMonkey* or *Typeform*: To design participant feedback surveys.
- *Focus Group Transcription Tools*: Otter.ai or Sonix for efficient feedback documentation.

Expected Outcomes

- More local ownership of adaptation strategies via stakeholder involvement in the adaptation strategy co-creation.
- Pragmatic knowledge of location-specific needs, hence providing customized and actionable climate adaptation solutions.
- Stronger capacity for community-led decision-making on climate resilience planning.

1.1.2. Gamification and Role-Playing Exercises

Purpose

Preliminary research conducted for Task T3.4 has demonstrated that emerging trends in gamification and creative arts offer substantial potential to reshape traditional educational methodologies. These approaches provide engaging, interactive, and meaningful ways to inspire proactive climate action. The insights gained from this research serve as the foundation for developing a conceptual framework within the NEUROCLIMA project, focusing on fostering climate engagement through playful learning experiences.

Approach

Gamified Simulations
Artificial intelligence or gaming-based games are specifically designed around aspects of any climate-related problem, such as carbon budgeting, resource management, or disaster preparedness.

- Example: "World Climate Simulation" by Climate Interactive (Sterman et al., 2015)-Interactive role-play plus systems modeling teach participants about the dynamics of global climate policy negotiations.
- Example: "GAIA Challenge" a game-based sustainability intervention that uses IoT data to engage students in energy-saving activities across multiple schools in Europe (Mylonas et al., 2021).
- Example: "EnergyCat & PowerSaver Game" for leaderboard-based competitive gaming strategies applied to household energy efficiency (Douglas & Brauer, 2021).

Role-Playing & Storytelling Exercises:
Participants take on certain roles, which may include any from policymaker, activist, or other community stakeholder, and go through a decision-making process related to climate.

- Example: "Future Climate for Africa" project where participants were able to role-play in considering adaptation strategies (Jones et al., 2018).
- Example: Role-playing exercises in higher education settings to simulate environmental policy-making (Barth & Rieckmann, 2012).

Blended Learning Approach:
Traditional education should be complemented by digital gamification to suit diversified learning preferences and demographics.

- Game-based progress tracking dashboards from WP5 Task 5.3 will soon be implemented as part of the project. These dashboards will facilitate iterative learning analysis and sustained engagement by integrating interactive storytelling services and interfaces.

Tools

Gamification Platforms:
- *Classcraft:* A gamified learning management system for engaging learners.
- *Kahoot* or *Quizizz*: Engaging quiz platforms on climate literacy.
- *SimCityEDU*: Enables the simulation of real-world urban challenges; resource management will be part of this.

AI-Powered Dashboards:
- *Tableau* or *Power BI*: Visualization of participants' progress, behavior, and engagement metrics.
- *AI-powered analytics tools*. This can be helpful for sentiment analysis and responding to gamified activities.
- *AI-driven sentiment analysis* from WP5 T5.4: This feature will soon be implemented to measure emotional and cognitive responses to gamified activities, ensuring engagement and accessibility improvements. Task 5.4 focuses on advancing decision-making support technologies by integrating knowledge-based approaches to climate-related dialogues.

Role-Playing Facilitation Tools:
- *Scenario Kits*: Pre-designed role cards and event scripts.
- *Miro* or *MURAL*: Visual collaboration platforms for structured role-play and idea development.
- *StoryMap* by ESRI: Interactive storytelling tool for narrative-driven gamified interventions. This tool, referenced in T3.4, supports the integration of spatial and temporal storytelling techniques into playful learning experiences.

Expected Outcomes

- Improved climate literacy: Participants gain deeper insights into climate systems and policy dynamics.
- *Behavioural changes*: More active engagement increases chances of pro-environmental behaviour.
- *Increased motivation*: Especially among youth and educators, it fosters continued interest in taking climate action.
- *Expanded user-centered gamification design*: Ensuring accessibility and inclusivity across digital learning platforms, based on WP5 Task 5.1 insights.

1.1.3. Creative Expression Platforms

Purpose

Use the technique of storytelling, creative expression, and new media to emotionally and cognitively engage citizens in climate-related topics.

Approach

Community Storytelling Workshops
Participants share personal experiences and create films, narratives, or visual artworks that tell about their feelings towards climate change.

- Example: "The Climate Visuals Programme" by Climate Outreach Corner et al. (2015) shows the use of striking visuals for the communication of the impacts and solutions of climate change.
- Example: The "Once Upon a Try" storytelling initiative by Google Arts & Culture, encouraging innovative storytelling on climate and science themes.

Public Exhibitions or Digital Platforms:
These outputs are put in public space, galleries, or online platforms for dialogues and awareness.
- Example of community mural projects, such as the "Green Graffiti" initiative, using urban art to address sustainability and climate issues.

- Example: YouTube or Vimeo online platforms for global sharing of community-generated climate narratives.

Feedback and Impact Evaluation:
- The research approach is characterized by interviews and participatory discussions with creators and audiences in order to understand emotional and intellectual impacts.
- Example: Participatory video feedback loops by Shaw and Krishnaswamy (2020) in refining their toolkit for climate communication.

Tools

Storytelling and Artistic Tools:
- *Adobe Creative Suite*: Premiere Pro, Photoshop, Illustrator for producing professional-grade films, visual and Narratives.
- *Canva*: For ease in design and collaborative creation of content.
- *StoryCorps*: An online tool for recording and sharing audio-based storytelling.
- Other Open-source choices: *Clipchamp*, *GIMP*, *Inkscape*

Exhibition Platforms:
- *YouTube, Vimeo,* or *TikTok*: Publishing videos and stories to larger groups.
- *Artsteps*: Building virtual gallery spaces for artwork or multimedia exhibitions.

Feedback Tools:
- *Otter.ai* or *Rev.com*: Transcription of interviews and participatory discussions.
- *Padlet* or *MURAL*: Collecting and analyzing qualitative feedback.

Expected Outcome

- Enhanced emotional engagement: Citizens connect emotionally with climate adaptation through personal and collective creative expression.
- Fortified Ccmmunity networks: Collaborative storytelling fosters stronger local relationships and shared climate advocacy.
- Localised advocacy: Tailored narratives amplify local voices, encouraging broader community action on climate issues.

1.1.4. Citizen Science and Participatory Cartography

Purpose

Involve citizens in the collection of environmental data and spatial mapping to facilitate evidence-based decision-making.

Approach

Data Collection by Citizens:
Participants use mobile applications and mapping tools to document environmental changes, such as air and water quality, flooding hotspots, or biodiversity loss.

- Example: The "AirCasting" platform, where users collect and share air quality data using portable sensors (Zikova et al., 2017).
- Example: "Community Flood Mapping" initiatives, such as those conducted in Jakarta (Budiyono et al., 2016), to identify flood-prone areas through participatory mapping.

Collaborative Data Analysis Sessions:
- Community members and experts collaborate to interpret the collected data, identify trends, and develop actionable solutions.
- Example: Participatory Geographic Information Systems (PGIS) used in Kenya to map resources and environmental challenges (McCall & Dunn, 2012).

Integration of Predictive Modelling:
- Data is analysed using AI-driven models to visualise trends and simulate future scenarios.
- Example: Use of machine learning in participatory forest management to predict deforestation patterns (Freeman et al., 2020).

Tools

Data Collection Tools:
- *ArcGIS* collector: For field data collection and spatial mapping.
- Epicollect: Free mobile data-gathering platform for citizen science projects.
- *Pollution Mapping Devices*: Low-cost sensors such as *AirBeam* for real-time air quality monitoring.

Mapping Tools:
- *QGIS*: Open-source software for geospatial data analysis.
- *Google My Maps*: User-friendly tool for creating custom maps collaboratively.

AI-Driven Predictive Modelling Tools:
- *Google Earth Engine*: For large-scale environmental data analysis.
- *TensorFlow*: Machine learning platform for predictive modelling and trend visualisation.

Expected Outcomes

- Augmented Data Ownership: Empowering citizens to take ownership of local environmental data fosters responsibility and stewardship.
- Refined Local Decision-Making: Evidence-based insights lead to more effective and locally relevant solutions for environmental challenges.
- Heightened Community Agency: Active citizen participation builds capacity for long-term engagement in environmental governance and adaptation planning.

1.1.5. Multi-Channel Digital Engagement Platforms

Purpose

Integrate face-to-face engagements with digital platforms to ensure inclusivity among diverse demographics.

Approach

Virtual Platforms of Idea Exchange and Feedback:
- The remote participants take part in the sharing of ideas, collaboration, and feedback through digital platforms during live or asynchronous sessions.
- Example: "Decidim" (Perelló et al., 2020), an open-source participatory platform used in Barcelona to involve citizens in urban planning and policy design.
- Example: Slack channels and forums for digital community engagement in civic projects by Bryson et al. (2013).

Real-Time AI Sentiment Analysis:

- AI tools analyze participant inputs during discussions or surveys to identify hot moments of engagement, emotional responses, and key themes for further exploration.
- Example: IBM Watson Analytics has been used for sentiment analysis in public health projects (Gonzalez et al., 2018).

Support for Multiple Languages and Accessibility Features:

- Platforms offer multilingual support through features like real-time translation and subtitles and accessibility features, such as voice commands and screen readers.
- Example: Live transcription in Zoom and integrations with translation tools to enable multilingual collaboration. (Cullen et al., 2021)

Tools

Virtual Collaboration Platforms:

- *Zoom, Microsoft Teams, or Webex*: For live discussions and remote collaboration.
- *Miro* or *MURAL*: For visual brainstorming and collaboration.

AI Sentiment Analysis Tools:

- *MonkeyLearn* or IBM Watson: For real-time sentiment analysis and synthesis of feedback.
- *Tableau* or *Power BI*: To visualize the metrics of engagement and participant insights.

Multilingual and Accessibility Tools:

- *Otter.ai* or *Rev.com*: For real-time transcription and accessibility.
- *Microsoft Translator or Google Translate API*: Live multilingual translation.
- *VoiceFlow*: For creating features of voice commands on digital platforms.

Expected Outcomes

- Increased participation: Wider reach through virtual platforms ensures involvement of participants across different regions and demographics.
- Inclusion of excluded groups: Access features and multi-language support give greater potential for participation to those often excluded because of an issue like language or disability.
- Better Transparency: Openness to discussions, immediate feedback, sentiment insight creates confidence in decision-making.

3.4.   Critical Interventions and Success Criteria

The pilot phase can assess the effectiveness of these methods by concentrating on key interventions, including:

- **Workshops and Focus Groups:** Evaluating participatory tools with various stakeholders.
- **AI Prototype Testing:** Verifying that tools adhere to usability, accessibility, and inclusivity standards.
- **Behavioral Surveys and Assessments:** Evaluating changes in knowledge, perceptions, and trust.
- **Inclusivity Metrics:** Assessing demographic diversity and equitable engagement.

Success Criteria:

- **Accessibility:** Tools designed for ease of use, featuring low technical barriers.

- **Inclusivity:** Representation across gender, age, and socioeconomic backgrounds.
- **Trust**: Evaluations of data security, transparency, and procedural fairness.
- **Engagement**: Enhanced participation rates and continued involvement.

3.5.   Expected Results and Lessons Learnt

The pilot phase can yield critical insights regarding the scalability and adaptability of participatory methods in various contexts.

- Obstacles to civic engagement and methods to address them.
- The function of AI in improving trust, transparency, and decision-making.
- Recommendations for enhancing tools and frameworks for comprehensive pilot implementation.

NEUROCLIMA integrates theoretical models with practical, AI-driven approaches to establish a basis for effective civic engagement, promoting local ownership and enhancing resilience to climate challenges.

4. Pilot Appraisal Structure (Simulated)

4.1. Introduction

The pilot appraisal structure is designed to evaluate the practical application of tools and activities developed during the project, with a focus on achieving accessibility, inclusivity, and trust. D7.7 suggests that two key types of tests can be conducted: (i)AI Monitoring Tool Testing (Pilot 1), where journalists, content creators, and policymakers use the tool in real-time scenarios to assess its operational efficiency, ease of use, and relevance, and (ii) Blended Learning and Participatory Activity Testing (Pilot 2), which includes in-person workshops and interactive sessions aimed at enhancing participant engagement and knowledge retention. These tests can provide critical insights into the effectiveness of the tools and activities, allowing for iterative improvements. To achieve this, a mix of qualitative and quantitative evaluation methods must be employed, including surveys, focus groups, and usability testing, ensuring feedback is comprehensive and actionable.

The success of the pilot can be measured against four primary criteria: **accessibility,** ensuring tools and activities are user-friendly and inclusive for participants with diverse needs and technical skills; **accuracy,** eliminating errors, and offering the ability to produce meaningful and relevant results in real-world contexts.; **inclusivity,** promoting active engagement and representation across all participant demographics; and **trust,** building confidence in the tools' security, transparency, and reliability. Success metrics can possibly include usability assessments, diversity tracking in participant data, and feedback on trust and transparency. Surveys and interviews will gauge perceptions of these aspects, while observation and case studies will provide deeper insights into participant experiences. These measures can help identify strengths and areas for improvement, ensuring the pilot phase aligns with project goals and establishes a strong foundation for full-scale implementation.

4.2. Methods for Measuring Success

Success during the piloting phase can be measured by using an overall mixed-method approach, comprising both qualitative and quantitative techniques that comprehensively assure the tools, activities, and participant experiences are adequately assessed. This approach is specifically designed to measure the critical success criteria of accessibility, inclusivity, and trust across diverse participant groups.

Surveys and Questionnaires

Quantitative data on participant satisfaction, perceived usability, and trust in the tools can be obtained using surveys and questionnaires. Such instruments may include Likert-scale questions for consistency in comparison and open-ended questions that provide nuanced feedback. The ease of navigation and user interface design can be assessed in terms of accessibility, while the inclusivity can be measured through questions related to representation and comfort during the pilot activities. Questions on trust might cover the areas of data security, transparency, and overall confidence in the tools.

Focus Groups

Focus groups allow participants to share their experiences in a structured environment, therefore enabling further probing into challenges, barriers, and areas of improvement. In regard to accessibility, discussions can focus on whether the tools were intuitive and user-friendly, while regarding inclusivity, it can be discussed whether the participants felt that the activities

accommodated their needs and backgrounds. Trust can be assessed by asking the participants to share their views on the reliability and transparency of the tools and activities.

Usability Testing

Observational usability testing involves the observation of participants when working with the tools to collect data on navigation patterns, error occurrences, and time on task. It would provide insight into what would be the possible accessibility barriers of the interfaces or the features that need explanation. Some metrics, such as completion rates and error resolution times, will give insight into where it needs simplification or a redesign.

Knowledge Retention and Engagement Metrics

For participatory activities, knowledge retention can be measured with both pre- and post-activity assessments, while engagement can be monitored through attendance, participation in activities, and responses about the learning environment. This data will be useful in determining if the activities meet the intended learning outcomes.

4.3.   Defining Success Criteria: Accuracy, Accessibility, Inclusivity, and Trust

The D7.7 envisioned that the success of the pilot phase will depend on the satisfaction of four basic criteria: **Accuracy, accessibility, inclusivity, and trust**. It should be effective, equitable, and widely accepted by participants in the development of tools and activities. These criteria can provide guidance during the evaluation process and inform the iterative improvements needed for full-scale implementation.

Accuracy

Accuracy refers to the precision, consistency, and reliability of the tools and activities in achieving their intended outputs and objectives. For tools, this includes the correctness of the data or content generated, the elimination of errors, and the ability to produce meaningful and relevant results in real-world contexts. For example, AI-generated outputs, such as monitoring results or automated reports, must align with user expectations and provide trustworthy, actionable information. Accuracy can be measured through a combination of content validation, error analysis, and participant feedback. Metrics such as the number of errors, alignment with predefined benchmarks, and user confidence in the outputs can assess the degree of accuracy. Additionally, structured feedback from focus groups and individual interviews can capture perceptions of tool precision, helping identify areas requiring refinement or improvement.

Accessibility

Accessibility refers to the degree of ease by which participants, irrespective of their technical proficiency or physical abilities, can access, interact with, and benefit from the tools and activities. For tools, this includes ease of use, compatibility with assistive technologies, and fewer hurdles to utilization. For participatory activities, accessibility encompasses clarity in communication, absence of jargon, and allowance for different learning styles. To measure the accessibility of the tool, usability tests will monitor navigation success rates, error frequencies, and participant feedback about tool functionality. Surveys and focus groups will further solicit information on perceived ease of use and any barriers participants perceive in their interaction with the tools or activities.

Inclusion

Inclusion ensures that the pilot phase actively involves a diverse range of participants, reflecting the varied demographics and needs of the target audience. This means creating environments where participants feel represented, valued, and empowered to contribute. Tools and activities should be designed to accommodate cultural, linguistic, and individual differences, promoting equitable participation. Metrics of inclusivity will include demographic analyses of the participants represented and qualitative feedback from underrepresented groups on their experiences. Particular attention will be given to the extent to which tools and activities are adaptable for use in a variety of contexts and accessible for people with low resources or technical skills.

Trust

Trust is essential in order to foster participant buy-in and commitment to the tools and activities over time. This includes transparency regarding the functionality of the tools, the security of participant data, and the reliability of the outcomes of participatory activities. Participants have to be confident that the tools will respect their privacy and that the processes are open and fair. Trust will be assessed by means of questionnaires on perceptions concerning data security, transparency, and reliability, complemented by qualitative information obtained from interviews and focus groups. It will also be operationalized through observational data on participants' behavior during activities, such as willingness to share feedback and to speak openly.

4.4.   Methodology for Appraisal

The appraisal methodology for the pilot phase is tailored to comprehensively assess the different tools and activities, as well as capture the necessary insights into their effectiveness, inclusiveness, and alignment with the project objectives. It shall adopt a mixed-method approach, combining quantitative measures and qualitative feedback to make a strong, evidence-based analysis.

4.4.1.   Data Collection Methods

Questionnaires and Surveys

Quantitative data from the participants can be drawn primarily through the use of structured surveys and questionnaires on aspects of accessibility, usability, inclusivity of tools, and trust within them. It will explore the rating in terms of user satisfaction with Likert-scale ratings and open questions about the challenges faced in this regard.

Focus Groups and Interviews:

In-depth discussions in focus groups can provide qualitative insights into the user experience. These sessions will delve into what participants think about the functionality, inclusivity, and usefulness of the tools in a real-world context. Individual interviews with specific user groups capture nuanced perspectives, especially of underrepresented stakeholders.

Demographic Data Analysis:

Participant demographics regarding age, gender, professional roles, and technical proficiency will be gathered and analyzed to determine how inclusive the pilot is. Such data will highlight where further diversity may be needed and will also make sure that the needs of a representative audience are met with the tools.

Observational Analysis

Real-time observation of participants during tool testing and interactive activities will be conducted to track user behavior, engagement, and any potential accessibility barriers. Metrics such as task completion rates, error occurrences, and time spent on tasks will provide critical usability data.

Pre- and Post-Activity Assessments

Pre- and post-activity questionnaires will be utilized to measure knowledge retention and engagement for participatory activities. These will quantify the learning outcomes and provide a basis to appraise the effectiveness of the tools and activities at meeting their educational objectives.

4.5.   Data Analysis and Reporting

Quantitative Analysis

Data from the surveys and assessments will be analyzed for patterns, trends, and areas of improvement using statistical methods. Success rates, satisfaction scores, and demographics are examples of metrics useful for determining quantifiable measures of success.

Qualitative Analysis

Feedback provided through focus groups, interviews, and free-response questions on surveys is subjected to thematic analysis for a deeper look into key lessons learnt, repeated challenges faced, and areas needing refinements.

Iterative Feedback Loops

The results of the appraisal will be employed in the continuous improvement of the tools and activities. Continuous feedback will ensure refinements are aligned with users' needs and address barriers identified.

4.6.   Success Criteria Alignment

This appraisal methodology will help determine the degree to which tools and activities would meet the criteria for success at the core: accessibility, inclusivity, and trust, while capturing perceptions of usefulness. By integrating data from multiple sources, this approach secures an integrated assessment for evidence-based decision-making processes with a view to full implementation. This will be performed with a set of customized KPIs covering the technical performance of the tools, as well as overall user experience. This is intended to capture holistically the understanding of effectiveness, inclusivity, and the alignment of the tools within the project goals, as captured through the integration of metrics on AI system, engagement metrics, and qualitative indicators. This evaluation framework will ensure that the KPIs suit the objectives of Pilot 1-AI Monitoring Tool and Pilot 2-Climate Literacy and Citizen Engagement-to this end, providing an understanding of performance, inclusiveness, and impact data from the tools. Insights from these will be important for iterative improvements and overall support to the broader objectives during the piloting phase.

4.6.1. AI Monitoring Tool Metrics (Pilot 1)

Model Performance Metrics

- *Accuracy and precision:* Assess the performance of the tool in real-life use cases by a journalist, content creator, or policymaker in terms of accurately identifying relevant content or trends.
- *Relevance of output*: Assess how well the tool delivers actionable, meaningful insights based on user queries.

Operational Efficiency Metrics

- *Response time:* Assess the speed at which the tool processes inputs and generates results in live scenarios.
- *Reliability metrics:* System uptime, frequency of errors, and recovery time from failures need to be monitored to ensure seamless user experience.

User Interaction Metrics

- *User retention*: Assess whether participants remain interested in and continue to use the tool over time.
- *Task completion rates*: The degree to which users successfully complete their intended tasks, such as content monitoring or data extraction.
- *Satisfaction scores*: Measured through surveys on ease of use, usability of the tool, and how well it met user expectations.

Accuracy Metrics

- Error Rate and Validation: Quantify accuracy by comparing the tool outputs against a validated "ground truth" to ensure consistent performance across a variety of scenarios.
- Prediction Quality: The degree to which the tool predictably identifies patterns, content, or decision-making inputs in line with pre-set use cases.

4.6.2. Climate Literacy and Engagement Metrics (Pilot 2)

Engagement Metrics

- *Participation rates*: Track the number of participants who attend and complete blended learning workshops, storytelling sessions, and other interactive activities.
- *Interaction metrics*: Measure the level and frequency of participant interaction during workshops, games, and participatory activities.

Knowledge Retention and Learning Outcomes

- *Pre- and Post-Assessments*: Compare participant knowledge before and after activities to quantify learning gains.
- *Application of Knowledge*: Measure the ability of participants to apply concepts learned, such as climate adaptation and sustainability, through follow-up assessments.

Creative Expression Metrics

- *Outputs produced*: Count the volume and variety of creative output developed in participatory workshops; for example, number of stories, films, or performances created.
- *Impact of creative outputs*: Assess how the creative outputs impact perceptions, engagement, and willingness to act through participant and audience feedback.

4.6.3.   Inclusion Metrics

Demographic Diversity

- Analyze demographics of participants, such as age, gender, professional background, and geographic representation to validate the inclusion and spot the gaps.

Representation and Adaptability

- *Participant feedback*: Collect qualitative feedback regarding if the tools and activities felt accessible, inclusive, and adaptable to a wide range of user needs.
- Equitable engagement: Track underrepresented or marginalized groups in participation to ensure that everyone is widely and equitably represented.

4.6.4.   Trust Metrics

Transparency and Reliability

Measure participants' confidence in the tools regarding transparency of results and how the data is handled.

User Confidence

Assess the trust of users through questionnaires concerning perceived security of data, fairness, and usefulness for real-life needs.

Willingness to Reuse and Recommend

Assess participant interest in reusing the tools and if they would recommend them to peers or stakeholders.

4.7.   Reporting and Insights

The insights gathered during the D7.7 phase will be synthesized into actionable outcomes that ensure **clarity, accountability, and guidance** going forward in the project, now entering the pilot phase. The reporting process will pay attention to the delivery of findings in a structured and accessible manner that enables stakeholders to identify areas of success, challenges, and opportunities for refinement.

Data visualization will be key in the presentation of the results, using charts, graphs, and heat maps to highlight critical success metrics. Participation rates will be analyzed to show the level of engagement across different demographic groups, while trust scores will be visualized to assess variation in user confidence in the tools. Demographic inclusivity will also be reviewed and represented through comprehensive visual summaries that will enable stakeholders to see at a glance how well the pilot activities/tools reached underrepresented or marginalized groups. These visualizations will provide a clear, direct understanding of the results and allow trends, successes, and gaps in data to be easily identified.

It will also report on best practice synthesis, documenting effective approaches and lessons learnt from the pilot phase. It documents approaches that worked well in increasing access, inclusivity, and engagement, as well as challenges or pitfalls found in the testing. Adjustments made during the pilot to respond to user feedback or unexpected issues will be documented to provide a transparent account of iterative improvements. This synthesis will emphasize practical insights that can help future decision-making and act as the foundational basis for scaling up and refining tools and activities in the following phases.

Clear and specific recommendations will be a core element of the reporting, ensuring actionable guidance on the refinement of the tools and approaches before full-scale implementation. Insights into the functioning and performance of the tools will inform refinements to enhance usability, accuracy, and operational efficiency, while recommendations for enhancing inclusivity will ensure that the tools remain adaptable and responsive to diverse user needs. Equally, methods to improve participant engagement and trust-gaining, including innovative means such as participatory storytelling or gamified learning, will also be developed in order to maximize the overall impact of the pilot.

Through detailed visual analysis, best practice summaries, and actionable recommendations, the insights gathered during D7.7 will provide a robust framework for refining and strengthening the tools and activities. This process will ensure the pilot phase not only aligns with project goals but also creates the foundation for successful full-scale implementation.

5. Risk And Challenges Anticipated at the Pilot Phase

This section summarises anticipated challenges and potential risks, ranging from technical and operational difficulties to stakeholder engagement and sustainability concerns. Furthermore, in order to minimise this, possible mitigation strategies are also identified alongside the challenges to improve the success of the implementation.

Category	Challenges	Mitigation Plan
Technical Challenges	**Technical difficulties**: the possibility of the system being down or not being able to support the demand/ load. **Integration of AI tools:** Compatibility issues, data integration difficulties, and AI outputs not meeting user expectations.	**Enhanced reliability** The solution tech stack will be based on battle-proven, trustworthy technologies and will be deployed on reliable cloud infrastructure. The tech stack will implement fully scalable solutions that will allow the system to scale horizontally by adding more infrastructure resources to meet increasing demand. **Seamless Integration**: Roll out AI tools in phases within controlled environments to address compatibility and integration issues. **Stakeholder engagement:** Organise workshops and hands-on training; provide comprehensive documentation. **Evaluate the applicability** of *NeuroClimaDialogue* for civic engagement feedback mechanisms.

User Adoption and Engagement	• **Understanding the tool**: End users may struggle to grasp AI tool usage due to unfamiliar features or undervaluing its importance. • **Interest**: Participants in workshops may lose interest, leading to reduced engagement and knowledge retention. • *NeuroClimaLearn* and *NeuroClimaPlay* can further develop interactive learning experiences and ways of engagement if envisioned for civic participation, considering the purposes of the project.	• **Comprehensive instructions**: Provide clear quick-start guides, video tutorials, and live Q&A sessions. • **Interactive training**: Conduct hands-on activities with gamification to increase engagement. • **Real-time surveys**: Use feedback loops to adapt strategies based on participant input and create practical suggestions for improvement. • **Explore** *NeuroClimaLearn* and *NeuroClimaPlay* as complementary solutions to improve civic engagement.
Financial Challenges	**Limited budget**: Budget constraints may limit tool development, affect AI monitoring testing (Pilot 1), and reduce the quality of materials for interactive sessions (workshops).	• **Budget planning and financial monitoring**: Prioritise high-impact activities and categorise essential expenses. Implement a tracking system to monitor adherence to the budget and avoid overspending.
Communication Gaps	**Miscommunication:** Gaps between civic participants and facilitators could cause confusion about the AI tool's purpose, reducing willingness to engage. 🞂 For Pilot 2, unclear communication may affect workshop objectives or learning outcomes.	• **Communication channels**: Establish informal real-time communication channels and keep participants updated to maintain transparency. • **Precise messaging**: Provide concise, consistent messages via emails or group chats for Pilot 1 and send workshop objectives and activities prior to each session for Pilot 2.
Sustainability and Exploitation	Lack of adoption of NEUROCLIMA results: Stakeholders might not integrate pilot outcomes into their workflows, threatening long-term sustainability.	• **Strong relationships and collaboration**: Build strong stakeholder relationships to demonstrate the tool's tangible benefits and offer open access to align with their needs. • **Effective use of social media**: Highlight stakeholder contributions to gain public recognition and reach similar target groups.
Metrics for Success	• **Complex metrics**: Metrics that are unclear or misaligned with project objectives may result in inaccurate pilot evaluations. • **Insufficient and unreliable data:** Poor questionnaire response rates may limit evaluation data.	• **Stakeholder contribution:** Collaborate with stakeholders to define clear, specific, and measurable metrics. Refine metrics during pilot phases based on observations and feedback. • **Simplify data collection:** Use streamlined tools, multiple touchpoints, follow-up reminders, and direct feedback during workshops or tool usage.

6.   Recommendations for future Implementation

The following chapter summarizes the key messages from the previous chapters. This is twofold: first, to provide recommendations to the NEUROCLIMA partners involved in the pilot implementation phase; and second, to echo the acquired knowledge beyond that case to a broader community of scholars and practitioners facing challenges similar to civic engagement for attempts at climate resilience.

6.1.   Enhancing the NEUROCLIMA Platform's Usability and Accessibility

To further ensure inclusivity, intuitiveness, and effectiveness for a wide category of users, improvements in usability and accessibility should be ensured at the NEUROCLIMA platform. Tools should be developed in a way to make their use easy and understandable by participants with any level of technical skill. Simplification of user interfaces and multilingual capabilities will enable this platform to be more extended and usable. Other means of ensuring access include the incorporation of assistive technologies, flexible content delivery methodologies like the use of blended learning formats, and visual and auditory resources that cater to different learning styles.

Iterative testing processes are necessary for continuous improvement. Continuous user feedback through usability tests, surveys, and focus groups will be very important in finding areas for refinement. It is only through such feedback that the tools can evolve to meet user needs both during and after the pilot phase.

6.2.   Strengthening Stakeholder Engagement

Meaningful and sustained stakeholder engagement is critical for the success of the NEUROCLIMA pilot phase. Engaging key target groups—such as educators, learners, citizens, youth workers, and policymakers—requires tailored outreach strategies. By developing communication approaches that address each group's specific needs and interests, NEUROCLIMA can encourage active participation and ownership of the tools being tested.

Co-creation processes, such as participatory workshops, tool-testing sessions, and citizen-led policy discussions, will empower stakeholders and ensure their voices shape the outcomes. Transparent communication channels must be established to articulate pilot objectives, processes, and anticipated benefits clearly. Building trust through transparency will foster long-term relationships and sustained engagement, both during the pilot phase and as NEUROCLIMA scales its tools for broader implementation.

6.3.   Evaluating Tools for Long-Term Use

Meaningful and intensive stakeholder involvement is fundamental for the success of the NEUROCLIMA pilot phase. In this direction, engaging key target groups requires well-articulated outreach strategies tailored to the needs and interests of each one. By developing communication approaches related to each group's particular needs and interests, NEUROCLIMA will be in a position to encourage active participation and ownership of the tools being tested.

Co-creation processes are participatory workshops, tool-testing sessions, and citizen-led policy discussions that will empower the stakeholders and ensure their voices are heard in shaping the outcome. Communication channels must be made transparent to clearly articulate the objectives, processes, and benefits expected from pilots. Transparency will build trust for long-term relationships

and continued engagement during the pilot phase and in the scaling-up phase as NEUROCLIMA scales its tools for wider implementation.

6.4.   Addressing Key Success Criteria

Critical success criteria on accessibility, accuracy, inclusivity and trust will determine the effectiveness of the NEUROCLIMA tools and methodologies.

Accessibility means that tools are broadly available, user-friendly, compatible with a wide range of devices and technical capabilities. Incorporating assistive technologies and user-centered design, the platform can promote meaningful participation across diverse user groups.

Accuracy guarantees that the tools deliver reliable and precise outputs for educators, citizens, and policymakers who will be using them. Regular validation and error analysis will be very instrumental in the assurance of inconsistencies for refinement before full implementation.

Inclusivity design calls for the necessity to involve underrepresented groups or excluded minorities through outreach strategies that exclude technical, linguistic, and resource barriers to participation. Such a design will go toward strengthening equitable representation by being sensitive to cultural and individual diversities.

Trust is considered core to participant confidence. Being communicative about data security and decision-making processes, thereby involving benefits realizable, will instill faith in the tools and the whole process for continued engagement of participants.

KPI Role within Piloting

Key performance indicators are important in the preparation for a pilot test, providing measurable benchmarks against which to assess success on all critical criteria. KPIs provide the basis for monitoring performance of the tools, user satisfaction, and long-term usability. Example:

- **Accessibility KPIs**: Some of the best examples include completion rate for every particular task, time required resolving errors, and finally how successfully the user was navigating.
- **Inclusivity KPIs**: Participation demographics for age, gender, and background will ensure that representation is fair.
- **Trust KPIs**: Participant feedback on perceptions of transparency, data security, and confidence in the tools will measure trust-building efforts.

Early integration of KPIs within the design phase of the pilots ensures that there would be systematic tracking of results for iterative refinements based on evidence-based insights. This measurable goal orientation not only guarantees the alignment of pilot activities to NEUROCLIMA objectives but also enhances scalability and applicability of tools relevant for real-world implementation.

In prioritizing these success criteria, the implementation of KPI-based evaluations allows NEUROCLIMA to make sure that the tools are aligned with the expectations of users and project goals, setting a path of continuous improvement.

6.5.   Bridging Research to Full-Scale Implementation

Moving from the piloting stage into full implementation needs clarity and a systematized process. Testing tools in various environments and with diverse user groups will provide further insight into

the adaptability and scalability of the tools. This ensures that the NEUROCLIMA solutions can answer a wide range of needs and contexts effectively.

Building from established frameworks, like the Democracy Cube and participatory design principles, will lead in the design of activities aimed at engagement and alignment with systemic project goals. Documentation of lessons learnt through a pilot phase of operation on what worked, what did not, and mitigation strategies taken is a useful document that may assist future implementation. It enables the NEUROCLIMA partners to review the processes to have the tools ready for wider application.

Conclusion

Deliverable D7.7: Experimental Approaches to Civic Participation. *Lesson Learnt 1* is an important milestone in the journey of NEUROCLIMA toward improving climate resilience through innovative, inclusive solutions. It provides a foundation for pilot testing focused on integrating artificial intelligence-based tools with participatory frameworks, hence empowering citizens, policymakers, educators, and other stakeholders in co-creating solutions to climate-related challenges.

The present deliverable brings together tips and lessons learnt in order to guide the pilot phase of NEUROCLIMA and to be used as a wide-ranging reference for academics, researchers, and other professionals. By foregrounding usability, accessibility, inclusivity, accuracy, and trust, NEUROCLIMA ensures that its tools and activities are effective, adaptable, and aligned with project objectives. In addition, it will offer a powerful framework to academics and professionals in designing, implementing, and evaluating tools to enhance civic engagement for improving strategies concerning climate adaptation. It provides the theoretical underpinning and criteria for success in methodologies that provide guidance critical to conducting evidence-based participatory projects. It puts strong emphasis on factors such as accessibility, accuracy, inclusiveness, and trust—benchmarks used to measure usability and the fairness of the different tools and initiatives.

A systematic implementation of Key Performance Indicators (KPIs) allows NEUROCLIMA to monitor outcomes in an objective way, assess and track progress, and point out areas for iterative enhancements. Feedback mechanisms, such as usability testing, surveying, and participant observations, enable refinement of the tools in real-time. Moreover, co-creation workshops and focused outreach build up trust and a sense of ownership among participants—ensuring the solutions developed will be both impactful and scalable. These are the foundation steps toward practical full-scale implementation. Moreover, a mixed-method evaluation strategy is followed, which includes qualitative techniques in the form of focus groups and interviews combined with quantitative instruments, including surveys, usability metrics, and demographic analyses. This will ensure that participant experiences and measurable outcomes are both well captured. This structured use of KPIs will provide a replicable way of tracking progress and evaluating success in similar projects.

The deliverable also comments on the theoretical frameworks of participatory design, the Democracy Cube, and deliberative methods to underline the importance of grounding practical interventions in proven theories. These insights will help researchers craft inclusive and impactful engagement strategies. It identifies common challenges in participatory initiatives, including barriers to accessibility, lack of inclusivity, and gaps in trust building, and offers practical solutions and lessons learnt to pre-empt and address these obstacles.

With its feet firmly planted in pragmatic considerations, the pilot phase of NEUROCLIMA points out potential pitfalls—technical and financial limitations, user acceptance challenges, and communication failures—and suggests mitigation strategies. Iterative feedback, stakeholder engagement, and

data-driven decision-making ensure that tools and methodologies are continuously improved to meet user needs and the overall project goals. Beyond the pilot phase, this deliverable serves as a roadmap for translating research into actionable plans that can be scaled for broader application. Combining best practices with innovative strategies, NEUROCLIMA has the potential to set new standards for public engagement in climate action. In addition, it highlights trust-building and inclusivity as crucial components for systemic change, ensuring the involvement of marginalised groups, transparency in processes, and equitable partnerships. These strategies enhance the durability and sustainability of the project outcomes while advancing climate adaptation and civic participation efforts.

In conclusion, the activities outlined in D7.7 establish a strong framework for NEUROCLIMA's pilot phase, paving the way for scalable and impactful interventions in line with the EU Adaptation Strategy and Mission on Adaptation to Climate Change. As NEUROCLIMA moves toward full-scale deployment, the methodologies and recommendations within this deliverable will remain central to empowering citizens and organisations to co-create a resilient future in the face of climate change.

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Annexes

6.6.   Annex 1 - Expectations for Pilot Phase

Partner Organization	Expectations
CEPS	Policy proposal vetted by citizens; journalists write articles with tool; users use multiple aspects of the NEUROCLIMA tool (e.g. search function AND bot); topics of policy and article are relevant
CATAA	Tools are intuitive to use; Users still want to use the tools in the future (after pilots); the pilots focus on improving the tools being tested.
POLIMI	The broader scope of the pilot is to understand which are the limitations and potentials of the NEUROCLIMA solution. In the case of Pilot 2, it can be expressed as it follows: UC 2.1 ● Educators and learners use the *NEUROCLIMALearn* application during the activities (online and in-person) within pilots. ● Educators trust this novel interaction and interfaces thanks to preliminary training sessions. ● Educators, using the *NEUROCLIMALearn* application in combination with other tools provided by the NEUROCLIMA integrated solution can search for, compose and upload resources as well as monitor learners' progress. ● Learners can access educational contents both synchronously and asynchronously, depending on specific occasion through *NEUROCLIMALearn* and *NEUROCLIMAPlay* applications. ● Pilots participants engage in activities and discussion with regards to climate related challenges and are able to express their own concern. UC 2.2 ● Citizens, and Youth Workers **use** the NEUROCLIMA tools for creative expression. ● Academic and public institutions, and NGOs will **organise** workshops (online and onsite) where they will invite citizens to express their concern and ideas surrounding climate related topics. ● Creative expression initiatives support **reaching** bigger communities.

6.7.   Annex 2 - Challenges and Solutions

Partner Organization	Challenges and Solutions
CEPS	**Challenges** Not enough users; no prolonged use; little diversity in users; not all tool features used; climate change topic increasingly defunded/dropping interest; pilot topics and data in tool are not aligned **Solutions** Include large-scale deliberative projects as partners for testing (*ORBIS, KT4D, Democratic Odyssey*); create community of practice with these projects; connect with climate change advocacy groups and movements; group catch ups between pilots and devs.
POLIMI	**Challenges** ● **Engage** learners and educators from a variety of educational contexts (primary schools, elderly, college). ● **Assure** educators use and will use hybrid, interactive and playful learning experiences. ● **Engage** citizens from diverse community backgrounds. I.e., the user group lacks diversity, as they all reside in the same neighborhood and share similar political views as well as age, gender, and ethnicity diversity. **Solutions** ● **Build** a community of teachers who can share insights from their initial learning experiences: these educators can expand the network within their own institutions; they can train their peers in applying these methods effectively. ● Start with student-led activities to encourage early engagement: **co-organize** student assemblies and similar initiatives; foster active participation and a sense of ownership in students. ● **Leverage** existing citizens initiatives to strengthen community involvement: use existing citizens' climate assemblies, engage with projects like ORBIS, NETZEROCITIES, CLIMAS and TRANSFORMAR. ● **Establish** communities of practice at multiple levels: Develop networks at both the local and EU levels; promote collaboration, knowledge sharing, and best practices.
CATAA	Tools are difficult to use; not enough users; no interest in using the tools in the future; not all tools are available for the Pilots Workshops to teach users to use the tools; contact potential users early; maintain focus on user needs while developing the tools and on how to differentiate them from other tools available

6.8. Annex 3 - Preferred Success Metrics & Criteria

Partner Organization	Preferred Success Metrics & Criteria
CEPS	**Metrics** Inclusivity of pilots; perceived usefulness of the tool **Criteria** Demographic data; user questionnaire; focus groups (especially for MVP)
POLIMI	**Accessibility** - **Metrics**: Completion rate for tasks, time required to resolve errors, successful user navigation - **Criteria**: Usability testing, error logs, participant feedback on ease of use **Inclusivity** - **Metrics**: Participation demographics (age, gender, background), representation of diverse communities, equitable engagement - **Criteria**: Survey responses, demographic analysis, tracking participation from underrepresented groups **Trust** - **Metrics**: Participant feedback on transparency, data security, confidence in tools, willingness to reuse and recommend - **Criteria**: Trust surveys, qualitative interviews, security and transparency evaluations, participant retention rates
CATAA	Number and variety of users involved; perceived usefulness and intention of continuing to use the tools in the future; climate literacy is improved