



# PHUSICOS

## According to nature

Deliverable 6.3

The PHUSICOS NBS Simulation – Moderator’s Handbook

Work Package 6 – Learning arena innovation to encourage knowledge exchange

Deliverable Work Package Leader:  
IIASA

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## Project information

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Web-site:	<a href="http://www.phusicos.eu">www.phusicos.eu</a>
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## Summary

Socio-ecological simulations, or serious games, are participatory tools where participants collectively explore complex realities and challenges. They have been shown to be effective learning tools that can support understanding of complex governance issues, including sustainable development, climate change adaptation and disaster risk reduction.

The PHUSICOS simulation is a serious game that was developed under the PHUSICOS' WP6 'Learning arena innovation to encourage knowledge exchange'. The game is set in a fictional setting (Phusicos region) at risk from multiple extreme events and in which different stakeholder groups are represented. The game places emphasis on negotiations that occur between stakeholders while they implement NBS or alternative solutions and weigh up their costs and co-benefits. The players learn to appreciate the complexity of the hazard and stakeholder landscape as well as the multiple benefits of NBS, and they gain experience by participating in the process of negotiated policy making.

This document serves as a Handbook for potential moderators to organize and facilitate the PHUSICOS simulation. The document was reviewed by project partners. It was also shared for comments with 20 attendees of a dedicated introductory webinar organized in September 2021.

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Appendix B	Detailed Gameflow
Appendix C	Player's Instructions
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## 1 How to use this Handbook

The purpose of this Handbook is to provide easy-to-use instructions on how to successfully moderate the PHUSICOS simulation. The Handbook will take you through the preparations to facilitate the simulation, simulation elements, and its interface, and all steps of the workshop facilitation.

The Handbook will first introduce you to the social simulation tool and then guide you through the steps of moderating the game play: logging in and managing the sessions; becoming familiar with the game interfaces; running the workshop from its introduction to the debriefing and survey; and answers to common questions.

If you cannot find the answer to your questions within the following pages, please contact us at [michalina.kulakowska@crs.org.pl](mailto:michalina.kulakowska@crs.org.pl).

## 2 Understanding the theoretical background of social simulations

Understanding the conceptual background of [social simulations](#) enables moderators to effectively provide the purpose and motivation of the policy exercise in opening the workshop. Game-based learning is immersive and experiential, yet participants often begin with skepticism that this method can be effective and useful. Moderators who understand the underpinnings of social simulations can also run debriefings more effectively by facilitating deeper and more reflective conversations.

A social simulation is an experiential process where a group of participants collectively explore a complex reality. It is *social* because it requires the participation of real people who represent different groups and organizations. We call it a *simulation* because it represents carefully selected real-world structures and processes. It is similar to a multi-player game, as it uses many game-like mechanics, but it also resembles interactive theatre by being open-ended and not pressing participants to achieve any specific goals.

Social simulations bring together participants with diverse backgrounds and values to interact in a shared, safe environment. In this simulated reality, participants take on specified roles, e.g., representing different actors in the policy process, including researchers, public administrators, businesses and NGOs or civil society. They have an opportunity to prioritize problems, plan and implement solutions, and solve conflicts via negotiations and dialogue. Together, they creatively experiment, test, and tinker with new ideas, after which they instantly face the outcomes of their collective decisions.



Figure 1: An illustration of social simulations elements and potential interactions between players. Source: [Centre for Systems Solutions, 2020](#).

It is an approach that combines the benefits of experiential learning (learning through direct experience) (Kolb, 2015) and social learning, that is: ‘[...] a process of iterative reflection that occurs when we share our experiences, ideas and environments with others’ (Keen et al., 2005, p. 9). The dialogue and exchange of ideas within social simulations removes barriers to learning (Sterman 2000) and can enable participants to understand and respect different and competing worldviews (Mochizuki et al. 2018). The shared experience often reduces communication barriers among diverse parties, enhancing trust, respect and understanding. As a result, participants may find it easier to find constructive compromises in otherwise polarized policy landscapes, leading to creative, inclusive, and resilient solutions, sometimes known as ‘clumsy’ solutions (Scolobig, et al., 2016) as well as inspiring change and action in the real world (Duke & Geurts, 2004).

The social simulation approach is thus ideal for addressing complex or wicked problems, i.e., ones where stakeholders can hold strongly conflicting perceptions of what both the problem and the solution are (Linnerooth-Bayer, 2021; Thompson, 2018) ones where the overall system behavior cannot be reduced to a simple sum of its parts. Even a few simple parts with complex interactions can lead to surprising, emergent behavior (Holland 1992). Complex systems have been studied within many disciplines (Berkes et al. 2008). In the context of sustainability and nature-based solutions (NBS), it is



important to consider both the problem-oriented (biophysical, technological, and economic) and people-oriented (psychological, ethical, social, and political) dimensions (de Vries, 2012). Systems that embrace all these dimensions simultaneously, as do the political and technological systems inherent in designing and implementing NBS (Martin et al., 2021) tend to be highly complex. It is this complexity of the system which tends to produce multiple perspectives and uncertain outcomes.

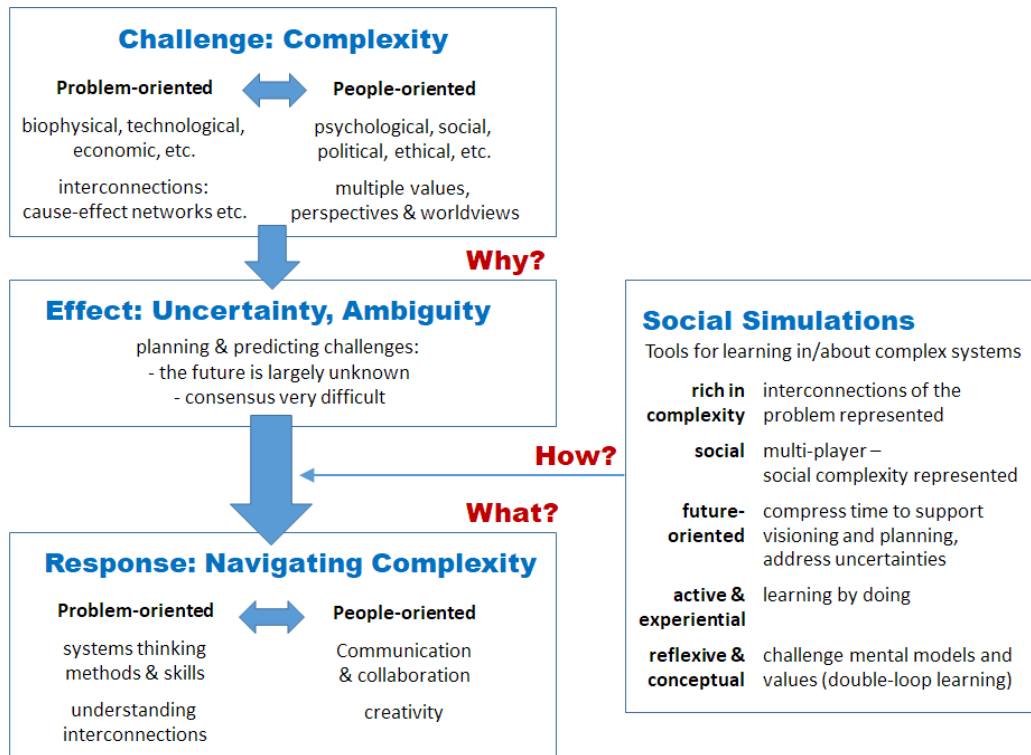


Figure 2: An illustration of social simulations impacts. Source: Centre for Systems Solutions, 2021.

Decision making and policy development in complex systems therefore require participatory systems thinking, where stakeholders openly reveal their assumptions and preferences or worldviews, develop a shared understanding of their challenges, and look for possible compromise ways forward.

Social simulations as a tool can greatly support this journey by providing a rich representation of the real-world problem situation, involving participants with different backgrounds, orienting towards the future, and allowing participants not only to talk but also to interact within the system and therefore to ‘learn by doing’. They provide participants with a way to keep their distance from the well-trodden paths of ideas and to look at the world from a different perspective. Seeing the results of their decisions often challenges implicit assumptions, leading to a deeper understanding, new creative ideas, and a commitment to action.

### **3 General description of the PHUSICOS simulation**

The PHUSICOS simulation is a multiplayer browser-based simulation focusing on the challenges related to the implementation of nature-based solutions (NBS) for disaster risk reduction.

The simulation sets emphasis on the negotiations between stakeholders in their attempts to implement available nature-based solutions. The role-playing aspect of the game will enable stakeholders to experience a situation where various and often opposing worldviews and goals are represented.

#### **3.1 Potential learning outcomes**

The PHUSICOS project aims to demonstrate the effectiveness of NBS and their ability to reduce the impacts of extreme weather events (extensive risks) in rural mountain landscapes. NBS are cost-effective and sustainable measures inspired by nature that attenuate, and in some cases prevent, the impacts of natural hazard events and thereby the risks that affect the exposed regions.

The social simulation aims to address underlying concepts and challenges related to NBS governance, including understanding or appreciating:

- Heterogeneous stakeholder values, worldviews and interests regarding NBS and other structural (grey) solutions
- Hurdles in communication and cooperation between local and national authorities, civil society, the private sector and non-governmental organizations;
- Multiple and wide-ranging co-benefits of NBS
- Differences between grey vs. green solutions in terms of their cost-effectiveness over time
- Governance barriers to implementing solutions.

During the game development process, the following requirements were taken into account: 1) the simulation has to be easily accessible to players, especially in ad hoc situations; 2) the moderator has to be able to organize multiple workshop sessions, also simultaneously; 3) moderators should be able to access the outcomes of previous workshops; 4) the outcomes of each workshop session should be treated anonymously, therefore they should be password-protected.

With that in mind, it was decided that the PHUSICOS simulation will be a browser-based application, where data is stored in a password-protected moderator account. When organizing a workshop, the moderator creates a unique link to a game session and shares it with the players directly.

## 3.2 Who can play?

The PHUSICOS simulation can be played by anyone, but is best suited to those working directly on NBS or disaster risk reduction, such as practitioners, decision-makers, stakeholders or researchers in the field. The recommended number of participants ranges between 8 and 40 players. Players can be grouped to play as one stakeholder in case of very large group sizes.

We recommend 1-3 moderators per game, or roughly 1 moderator for groups of up to 20 people.

## 3.3 Skills required by moderators

To effectively moderate the PHUSICOS NBS simulation in an online environment, the moderator should have a basic understanding of the principles of social simulations and an appreciation for their potential as an educational tool. Familiarity with the key concepts of nature-based solutions (NBS) and disaster risk reduction is important, but in-depth technical knowledge may not be necessary, as instructions and guidance can be readily accessed during the workshop. The moderator should be comfortable with the digital tools and platforms used to conduct the simulation (e.g., web browsers, conference software) and must be able to guide participants through the virtual environment, troubleshoot technical issues, and manage digital documents or resources that are part of the simulation.

Engaging stakeholders effectively is a critical skill for the moderator. This includes the ability to identify and invite relevant stakeholder groups, communicate the purpose and goals of the simulation clearly, and create a welcoming and inclusive environment that encourages active participation. The moderator should possess excellent interpersonal skills, including diplomacy and cultural sensitivity, to facilitate interactions between stakeholders who may have differing or opposing views. The ability to actively listen, mediate conflicts, and build consensus is essential. The moderator must also have the skills to maintain stakeholder engagement throughout the workshop, managing the dynamics of the group effectively and ensuring that all voices are heard and valued.

Lastly, strong communication and reflection facilitation skills are key. The moderator should be adept at engaging participants in meaningful dialogue and encouraging active participation. The ability to lead reflective debriefings that help participants connect their simulation experiences to real-world contexts is also important, even in an online setting. Patience and adaptability are crucial, as moderating an interactive and potentially complex activity in a virtual environment may present unique and unexpected challenges. Table 1 summarizes the key skills needed by moderators.

Table 1: Summary of skills required by moderators

Area of expertise	Specific skills
Thematic knowledge	<ul style="list-style-type: none"> <li>• Basic understanding of social simulations principles</li> <li>• Familiarity with key concepts of NBS and disaster risk reduction</li> </ul>
Digital skills	<ul style="list-style-type: none"> <li>• Comfortable with digital tools and platforms used for online workshops</li> <li>• Ability to guide participants through the virtual environment and troubleshoot technical issues</li> </ul>
Stakeholder engagement	<ul style="list-style-type: none"> <li>• Ability to identify, invite, and communicate effectively with relevant stakeholder groups</li> <li>• Skill in creating a welcoming environment and mediating conflicts among diverse stakeholders</li> </ul>
Communication and Reflection Facilitation	<ul style="list-style-type: none"> <li>• Adept at engaging participants in meaningful dialogue and encouraging active participation</li> <li>• Ability to lead reflective debriefings that connect simulation experiences to real-world contexts</li> </ul>
Patience and Adaptability	<ul style="list-style-type: none"> <li>• Patience in navigating unique and unexpected challenges</li> <li>• Adaptability in response to the evolving dynamics of the virtual environment</li> </ul>

## 4 Preparation to moderate the simulation

We find it helpful to print out some of the same materials to make it easier to facilitate. To save paper you can also use digital documents. If you have access to another monitor, you might want to use it too. With two or more screens, it will be easier to follow what’s going on in the game and game flow at the same time. Make sure that you have tested software and devices you are going to use during the simulation.

Prepare yourself to make the introduction - practice it and, if possible, send the short one-pager instructions to the players before the workshop. Just in case, prepare a draft of an email with email addresses of all participants - in case of an emergency, you will be able to quickly send a message with additional information and/or materials.

### During the Registration Period

- If you are inviting international guests, make the time zone of the workshop very clear if people will be playing from different locations. Send a link with a time zone converter to help.

### 2 Days Before the simulation

- Check for updated version of a browser you will be using
- Send an invitation for a remote meeting (with software such like Zoom, MS Teams or Skype) - players may not call in

### 1 Day Before the simulation

- Prepare link to the simulation and other materials you might need (instructions, presentation)

## Day of the simulation

- Log in to the teleconferencing software
- Use presentation mode to share the intro presentation
- Log in to the game on a computer as moderator to use it for displaying the map and results

## Running the simulation

- Explain the setting and the game's world (with help of presentation)
- Use the game flow document to manage the game
- Run debriefing

# 5 How do you start the simulation?

This section guides you through how to be a PHUSICOS simulation moderator. In September 2021, a webinar was held to briefly explain the aims of the game and how to run it. You can watch a recording of the webinar [here](#).

## 5.1 Requirements

The PHUSICOS simulation was developed during the COVID-19 pandemic, which is reflected in its design. The simulation can be used remotely, in tandem with conference software such as Zoom or MS Teams (to sustain audio-visual contact with participants), or in a face-to-face setting when all players and moderator gather in the same room with their devices.

Both formats have their strengths and weaknesses. Remote sessions are often more inclusive to people with limited mobility, whereas live sessions tend to be more engaging and provide more opportunities for direct interactions. Before you decide on the format, consider 1) access to a venue; 2) digital skills of attendees; and 3) composition of your group of attendees.

The game does not require any installation and can be used in ad hoc situations, just by using devices with one of the browsers listed below.

### Requirements (YOU)

1 computer

- **Technical requirements:**
  - An internet connection – broadband wired or wireless (3G or 4G/LTE)
  - Speakers and a microphone – built-in or USB plug-in or wireless Bluetooth
  - Power outlet
- **Supported browsers:**
  - Windows: IE 11+, Edge 12+, Chrome 30+

- Mac: Chrome 30+
- Linux: Chrome 30+

For moderator we recommend using 2 screens.

### Remote setting

- A teleconference software of your choosing (e.g., Zoom, Teams)
- A webcam or HD webcam - built-in or USB plug-in
- Alternatively, a HD cam or HD camcorder with video capture card
- For moderator we recommend using 2 screens

### Recommended software for remote settings

- Conference software:
  - Such as, for example, Zoom, Skype or MS Teams
  - Any software that enables moderator to:
    - Share the screen
    - Divide participants into groups
- Virtual whiteboard software (for debriefings):
  - [Miro board](#)
  - [Mural](#)
  - [Google Jamboard](#)
- Other helpful software (for quick live surveys):
  - [Mentimeter](#)

### Language requirements

The PHUSICOS simulation is currently available only in English. However, if you are interested in running the game in a different language, we have designed the game such that all in-game text can easily be extracted. This means that if you are able to translate the game text into your native language, we can support you in creating a game version in a different language.

## 5.2 Logging into the game as a moderator

To login as a moderator, you will need to receive the login credentials. These are freely available to anyone interested in playing or moderating the game. As of this moment, the automatic system for account creation is not yet implemented. To receive login credentials, please contact [michalina.kulakowska@crs.org.pl](mailto:michalina.kulakowska@crs.org.pl).

After receiving your individual login credentials, [follow this link](#). You will be redirected to the login page for the online platform where the simulation is hosted.

You can use the provided login credentials to login into platform.

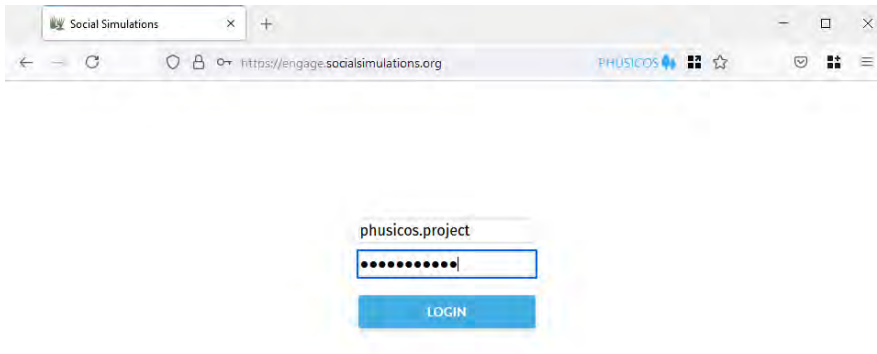


Figure 3: View of the Simulation platform's moderator login page.

### 5.3 Creating and managing game sessions

Creating the game session requires a unique link that you can share with the players. For this, you need to 1) choose 'PHUSICOS' from the expandable template list; 2) click the 'CREATE GAME' button; 3) when the platform prompts you to name the game session, choose a name to identify your session later on; 4) click the "Ok" button. The game session should now be visible in your list of sessions.

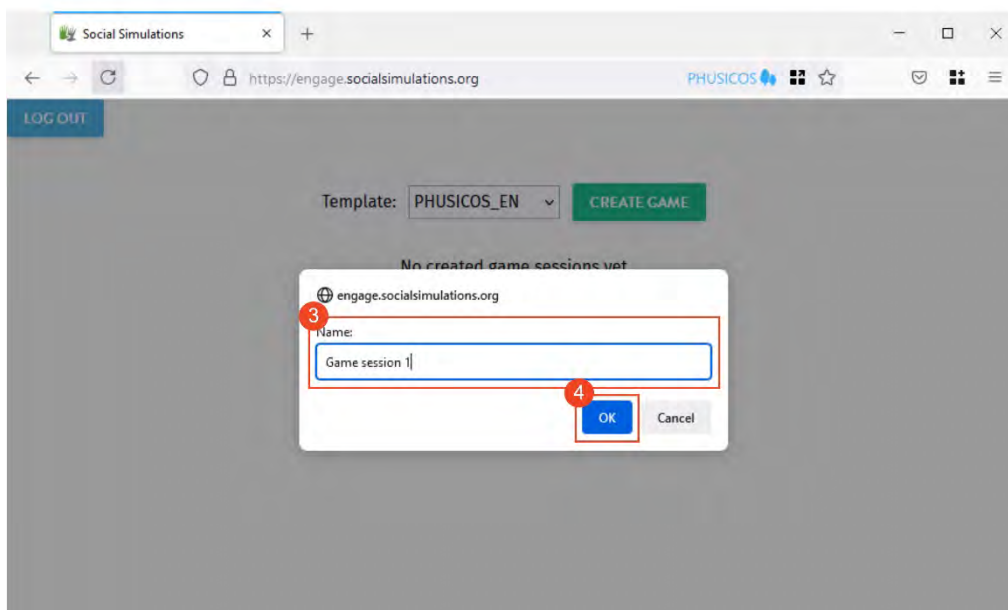
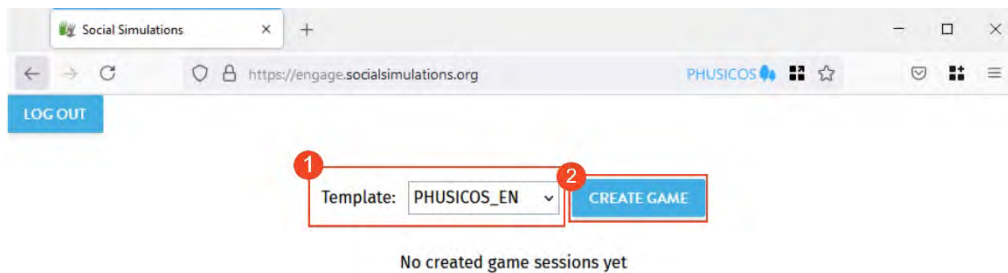


Figure 4: Creating a game session. 1) Choose from the expandable list template' PHUSICOS template; 2) Click the 'CREATE GAME' button; 3) When the platform prompts you to name the game session, write the name to identify the session later on; 4) Click the 'OK' button.



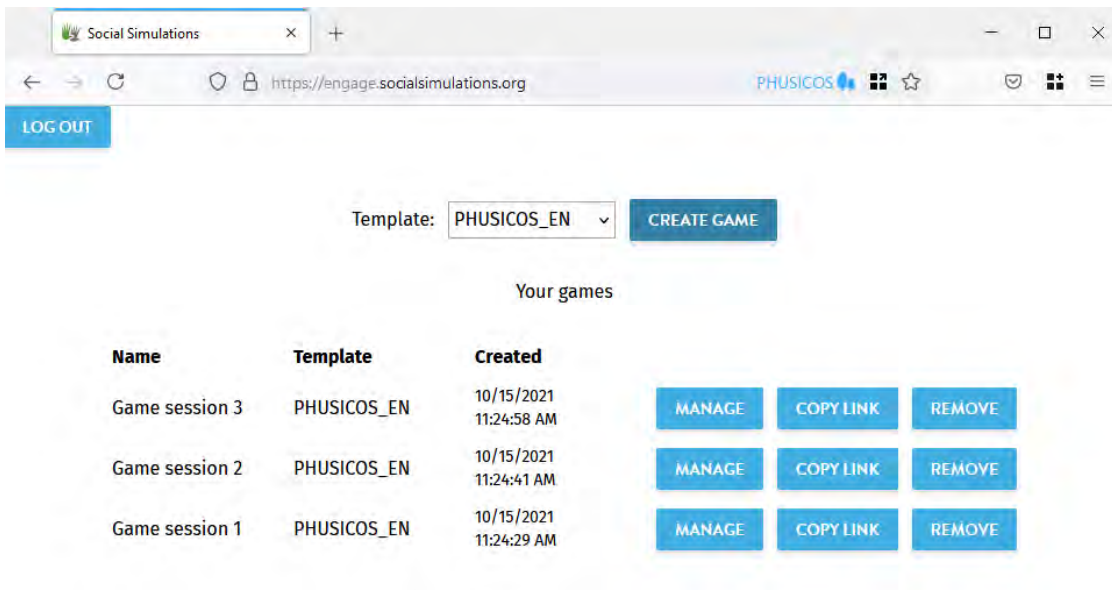


Figure 5: List of the Game sessions created by one moderator. View from the moderator account.

Each game session has 3 available options: 1) ‘Manage’; 2) ‘Copy link’; and 3) ‘Remove’. Use the ‘Copy link’ button to quickly copy and share the link with the participants of your workshop. The ‘Manage’ button will take you directly to the session’s moderator interface (more details in chapter 4.3). By clicking the ‘Remove’ button, you can delete the session. Be careful, as by clicking this button you lose all the data contained in the session, and the unique link for the session will be inoperable.

## 6 Elements of the PHUSICOS simulation

This section helps you understand what you and players will see during the PHUSICOS simulation and what it means. Players take on roles and make decisions in a world that is still unknown to them. As the moderator, you will have to familiarize yourself with the mechanisms of all these specific elements in order to facilitate the game. In our experience, players’ questions will in a first instance often relate to what they can and cannot do in the game in relation to the different game elements and associated actions..

### 6.1 The Problem

The PHUSICOS simulation takes place in the Phusicos region with players taking on different stakeholder roles with high stakes in the current situation. With Phusicos City at its center, Phusicos region is surrounded by sharp mountain peaks and with a river that flows through the area. Occasional landslides and floods that intensified during the past two decades wreak havoc among people living in the area, destroying their livelihood. The region also faces other economic and societal challenges, which disturb




the efforts to lower the risk of further damages. Players have a year (12 phases representing months) to decide their priorities and decide which of the proposed projects – green solutions or grey solutions, or both - should be implemented in the region. Only the projects that are fully funded at the end of November, will be implemented. The feedback is given in two dimensions – immediately after acceptance of the budget (December) to show the initial reactions to the plans – and in long-term (Future) to show the outcomes of the decisions.

During the simulation, players participate in negotiations on various levels: internal organizational, and bilateral. They are also invited to participate in series of obligatory public consultations that provide another opportunity to collectively decide on the course of action. At the same time, participants need to navigate the inflow of information about the current situation and future prognosis about the benefits and co-benefits of projects in form of newspaper and scientific journal posts and community voices.

## 6.2 Organizations and their members (Players)

In many cases, responsibilities were intentionally split between roles to provide incentives for cooperation. Whether players cooperate or not is up to them, but clear opportunities for working together have been built into the different stakeholder roles (Table 2).

Table 2: Playable stakeholders in the PHUSICOS simulation

Icon	Full name	Description
	Local Government: infrastructure and development	The Department of Infrastructure and Development is responsible for local infrastructure and the collaboration with country-level administration.
	Local Government: environment and tourism development	The Department of Environment & Tourism Development is responsible for the development of local tourism and recreational areas.
	Local Government: Civil Protection Agency	The Local Civil Protection Agency is responsible for promoting preparedness and the implementation of protective measures on a regional scale.



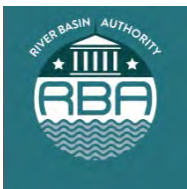
National Civil Protection Agency

The National Civil Protection Agency is responsible for promoting preparedness and implementation of protective measures on a national scale.



Ministry of Environment and National Parks

The Ministry of Environment and National Parks is responsible for forest and mountain areas in the region, which officially belong to the state.



River Basin Authority

The River Basin Authority is a local authority responsible for the management of the river basin.



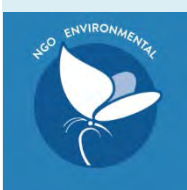
Local Entrepreneurs Group

The Local Entrepreneurs Group is a local organization that promotes local business and economic development in the region.



Local Farmers Collective

The Local Farmers Collective is a local organization that protects the interest of the local farmer community.



Environmental NGO

The Environmental NGO is a non-governmental organization focused on promoting sustainability and the natural environment.

## Player's logins and role distribution

To enable players to log into the simulation, send them a link to a session you generated. They will see a list of available roles. On the login screen, players will be able to choose their roles by clicking 'Select'. If more than 9 players are joining your session, after all roles are taken, new roles will automatically pop-up on the screen.

You can divide players on a voluntary basis or ask them to choose a specific role depending on what effect you want to achieve. Players tend to choose the roles they are the most familiar with, so if you want them to look at the system from a different perspective you might encourage them to pick roles they are not familiar with.

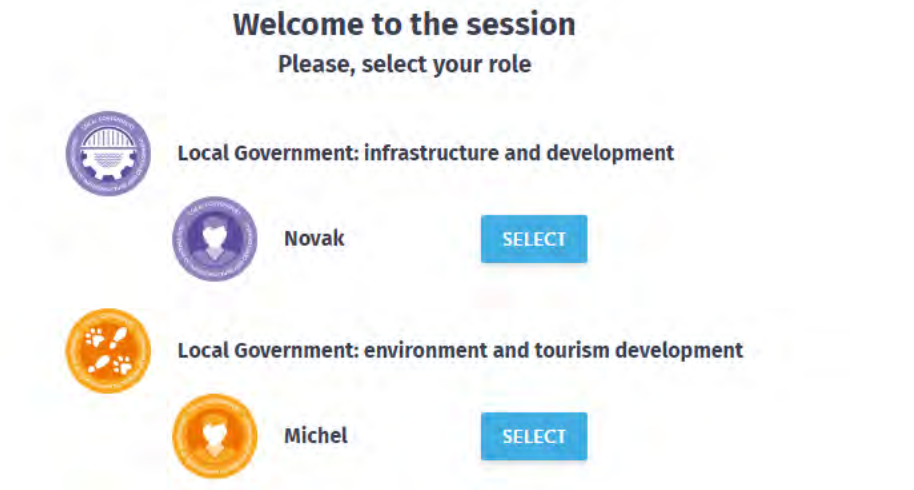


Figure 6: Player's login screen

### 6.3 Investments decisions

The participants can choose from various potential investments that represent both green and grey infrastructure. Each organization has specific bias towards one or more available projects (table 3).

Table 3: Projects available for players

Name	Description	Type of solution
Reconstruction of the riverbed	The measure encompasses the widening, deepening, and re-meandering of the riverbed. This might regulate the river flow and reduce sediment delivery, thus decreasing the risk of floods. It will also positively affect the local biodiversity and increase soil retention (Environment). The investment requires the use of land next to the river for implementation. The project will also require expert knowledge and specialized force to finish up the job (Technical feasibility). The project might also bring some potential challenges connected to the increased erosion.  Time necessary for implementation: long-term	Green

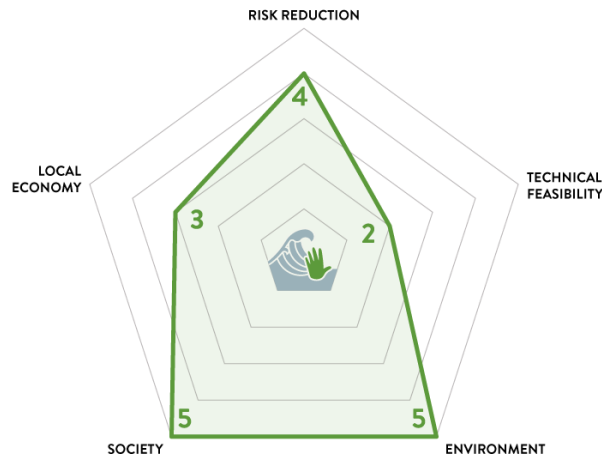


Figure 7: Reconstruction of the riverbed spider graph

<p>Planting of indigenous plants on riverbanks</p>	<p>The measure encompasses planting selected species of indigenous plants on the riverbanks. This might potentially increase the water quality (due to filtration) and reduce riverbank erosion. The project will create new habitats for riverine flora (Environment). The project might also bring some potential challenges connected to the maintenance and the vegetation of the plants and reducing the area available for other activities (Technical feasibility).</p> <p>Time necessary for implementation: medium-term</p>	<p>Green</p>
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Figure 8: Planting of indigenous plants on riverbanks spider graph

<p>Reforestation in upstream area of the river (multiple vegetation layers)</p>	<p>The measure encompasses reforestation in the upstream area of the river. This might potentially increase water retention and create shelter and new habitats for local species (Environment). It will also help to decrease soil erosion. The investment requires the use of land next to the river for implementation. It also requires a lot of workforce</p>	<p>Green</p>
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and expertise during the planning process (Technical feasibility). In the long run, new forest can, if well maintained increase the aesthetic and touristic potential of the region

Time necessary for implementation: long-term

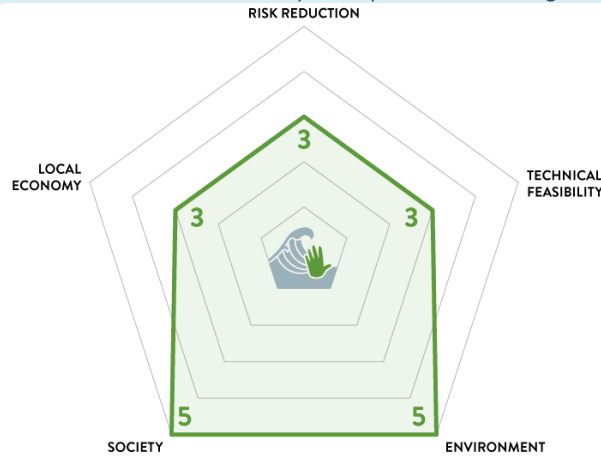


Figure 9: Reforestation in upstream area of the river (multiple vegetation layers) spider graph

Revegetate steep slopes: 'hydro seeding' or 'spray cover' grasses on mountain pastures

The measure encompasses the revegetation of steep slopes in the region. The project might diversify the local species and make them more visually attractive (Environment & Society). It potentially minimizes the dangers of local landslides but requires expert knowledge to implement (Technical feasibility). The investment requires the use of a big acreage of land.

Green

Time necessary for implementation: medium-term

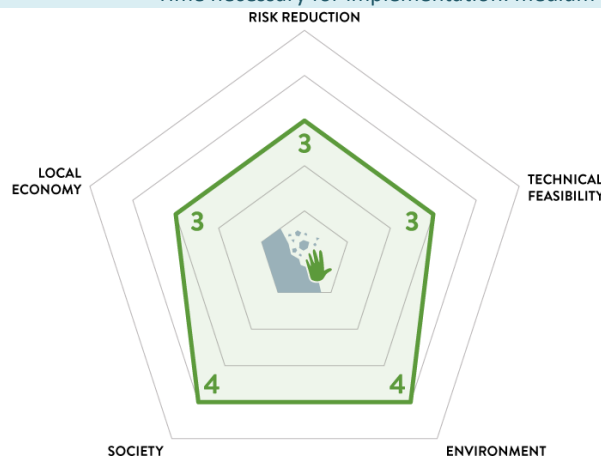


Figure 10: Revegetate steep slopes spider graph

Afforestation of mountain slopes

The measure encompasses the afforestation of mountain slopes and temporal retention nets that will protect the slopes during the growth process. This might potentially increase water retention and

Green

create shelter and new habitats for local species (Environment). The investment could potentially slow down erosion. It will also require some acreage of land.

Time necessary for implementation: long-term

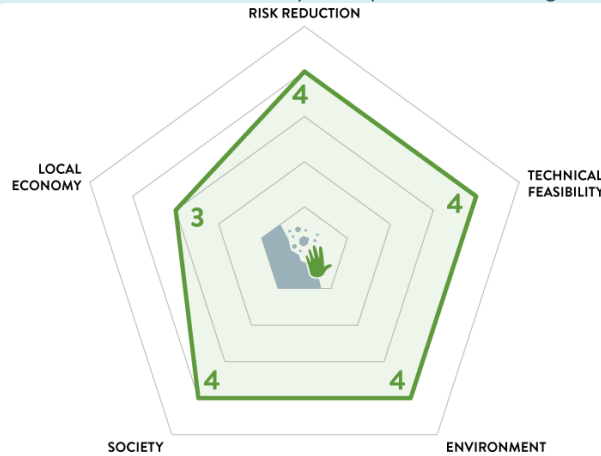


Figure 11: Afforestation of mountain slopes spider graph

<p>Dam</p>	<p>The measure encompasses erecting a dam. The investment will protect the local community from floods. It's a very well-known measure, often connected with safety. There are many people in favor of the dam among the community and decision-makers, but its aesthetic value is dubious. It may potentially also serve as a risk to the landscape heritage, not only directly in the Phusicos region, but also downstream from the region. But the investment also has a lot of downsides, e.g., it will be a barrier to the spread of local species and influence river flow (Environment). The act of erecting the dam is costly, as are the future maintenance costs (Technical feasibility).</p> <p>Time necessary for implementation: long-term</p>	<p>Grey</p>
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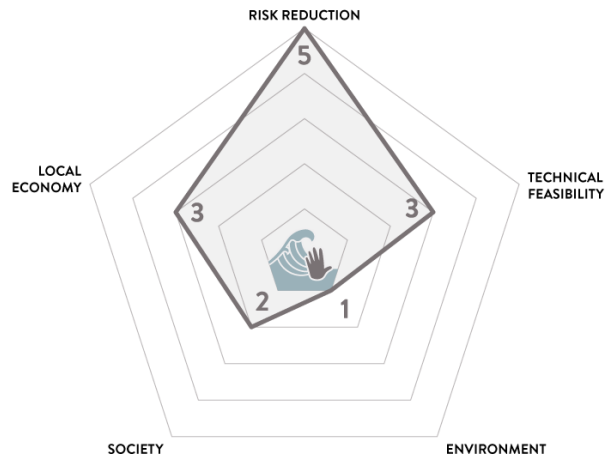


Figure 12: Dam spider graph

**Retention nets (for soil and rock falls)**    The measure encompasses the use of retention nets for preventing / protection against soil and rock falls. It decreases the dangers of local landslides. The process of implementation is short and does not require vast acreage of land (Technical feasibility). Depending on the placement, nets might negatively influence the spread and condition of local fauna and flora, as well as decreasing its attractiveness (Environment & Society). The process can lead to high maintenance costs.

Grey

Time necessary for implementation: long-term

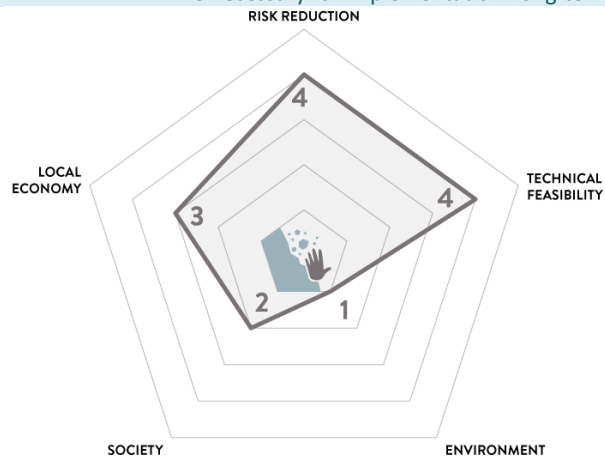


Figure 13: Retention nets (for soil and rock falls) spider graph



## 6.4 Moderator's Interface

The moderator's interface is composed of left and right sidebars. The left sidebar enables a moderator to go back to a list of created games ('Main Menu') and log out of the platform. It also provides basic information on the status of the game ('Phase'). The right sidebar consists of control buttons used during the game. The 'Redirections' buttons allow a moderator to transport players to specific tabs within the game (e.g., chat or investment window). The 'Other' buttons allow a moderator to manage the information flow ('Post groups', 'Assets'), players activities ('Users', 'Block Investments'), and time flow ('Next phase').

Besides the control panel visible only to moderators, a moderator sees all the information available to the players, including discussion in public and internal chats.

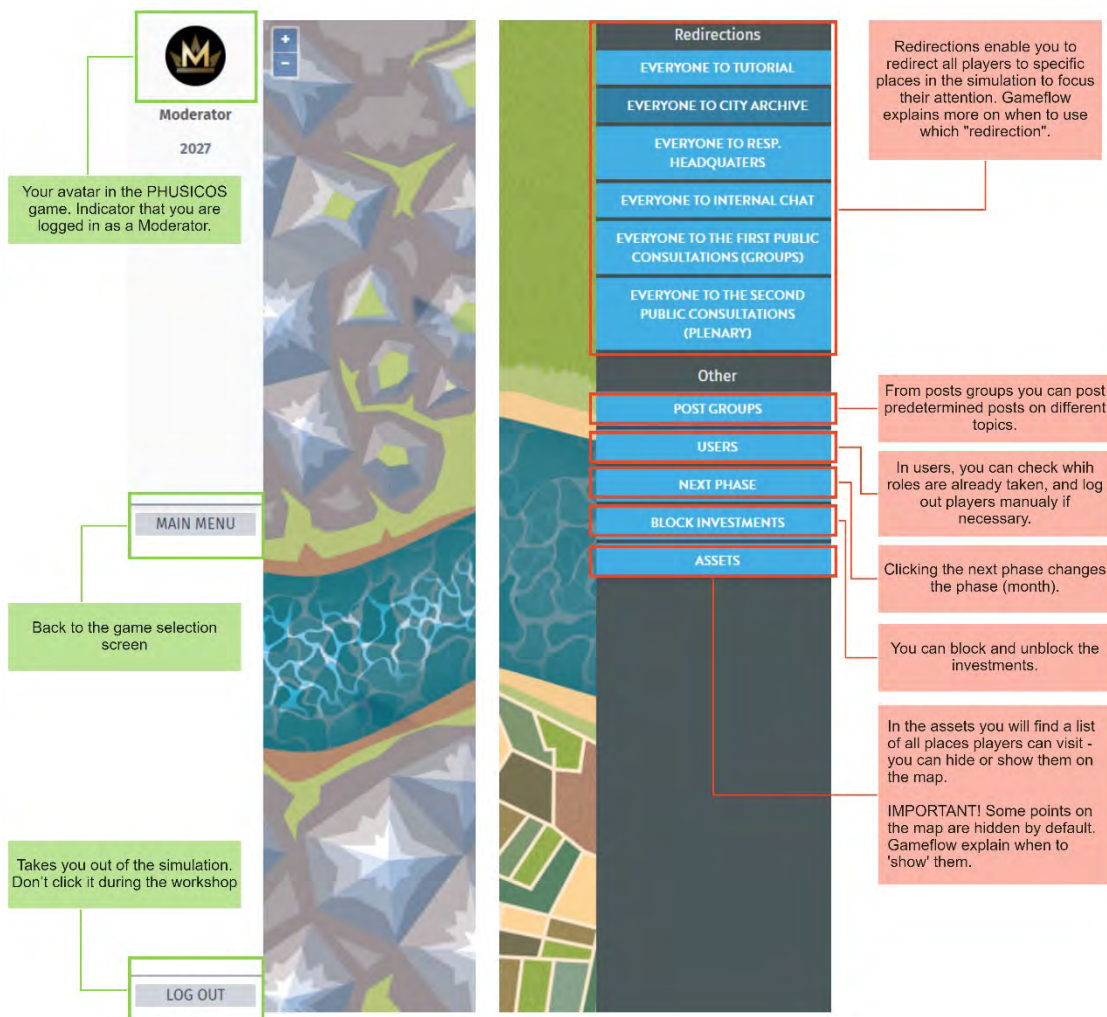


Figure 14: Graphic explaining moderator interface. The view on the left and right sidebars.

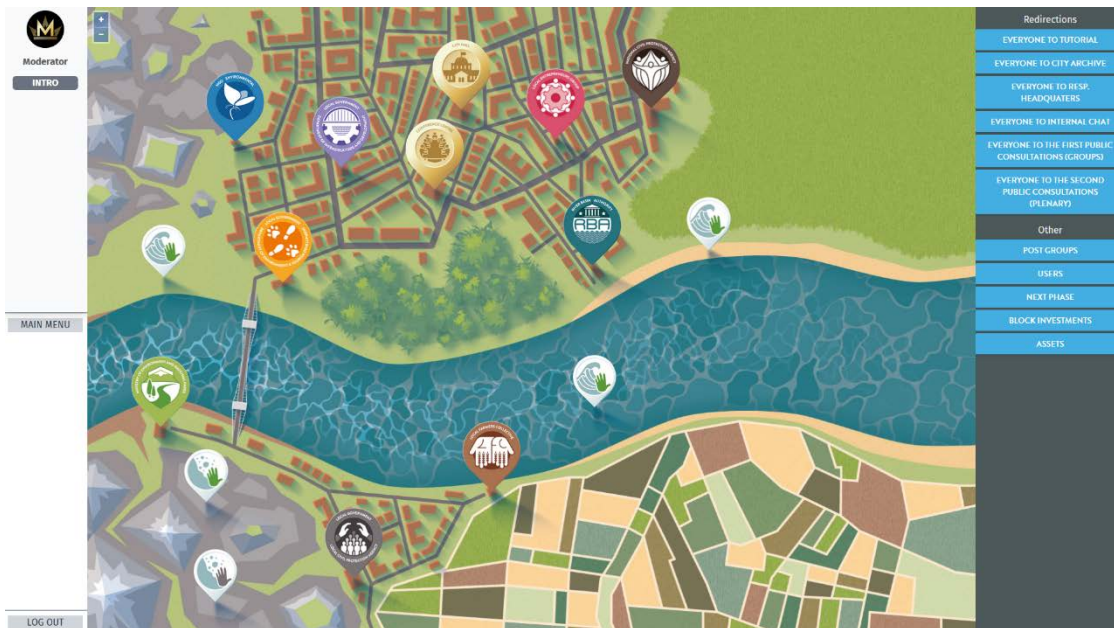


Figure 15: The full view on the moderator's interface.

## 6.5 Player's Interface

The player's interface is based on the idea of an interactive map, which players can explore freely or with guidance from the moderator. Players can visit potential investments sites, support investments by dividing their organizational budget, or veto projects that they deem unsuitable for the region. While exploring, they can communicate via chat messages available in public locations or visit different organizations to negotiate in smaller groups.



Figure 16: General view in the PHUSICOS simulation interface from a player’s perspective.

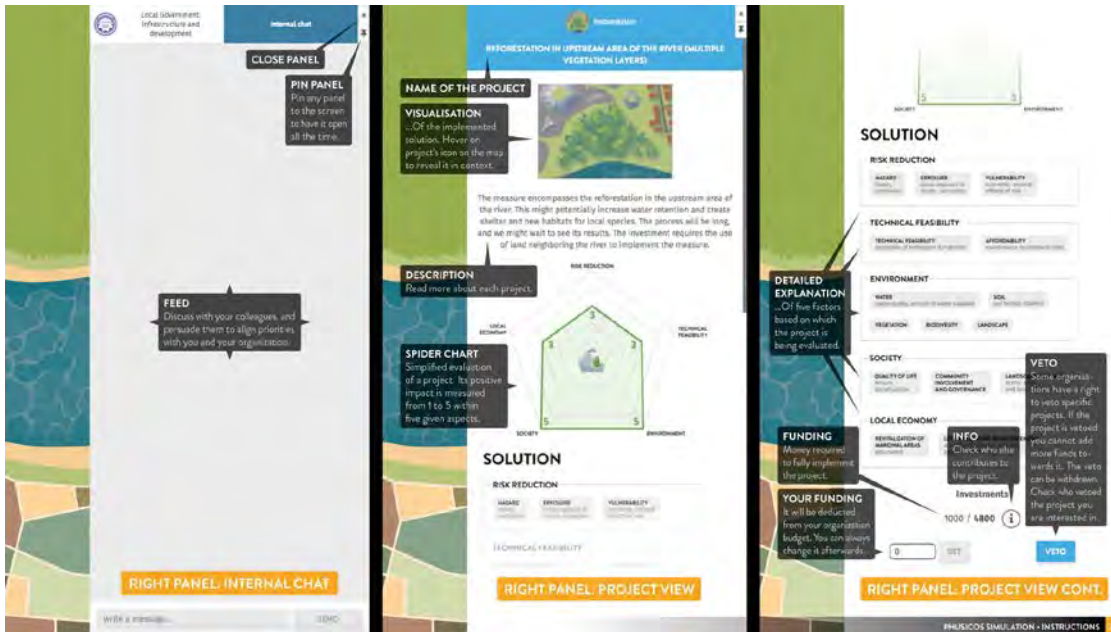


Figure 17: View on chat and projects in the PHUSICOS simulation interface from a player’s perspective.

Instructions for players are also attached as graphic and can be shared with players directly. Appendix C provides a more detailed version of the instructions.

## 7 Flow of the simulation

The moderator plays a critical role in guiding players through social simulations. He or she is a game master, facilitator, and helper. However, moderators also have to be careful not to get too involved in the action. Although they are responsible for outlining in the key aims and steps the game, they should more be seen as detached advisers than engaged wizards. Moderators are responsible for guiding players through a smooth gameplay and for answering technical questions. However, they should try to avoid telling players how to act strategically or what exact steps to take. The reason for this is that players are supposed to test ideas and solutions independently – there is no ‘right’ or ‘wrong’ way to play the game. Table 4 summarizes some common mistakes to avoid and encouraged actions as a moderator.

Table 4: ‘Dos’ and ‘Don’ts’ of facilitating the simulation

DOs	DON'Ts
Be confident and assertive	Don't set goals
Allow players to ask questions	Don't rely too much on notes
Make it fun and engaging	Don't jump from point to point
Practice your introduction!	Don't emphasize winning/losing

DOs	DON'Ts
Be reassuring! ("Confusion is normal, you will get it")	Don't obsess over keeping an eye on the time during the introduction and debriefing
Organize the introduction in a sensible way - basic information should always be communicated to all	Don't provide too much information at once
Focus on the game – you can talk about the real world in debriefing	Don't get carried away in discussing real-life issues rather than the game setting during the gameplay

## 7.1 Introduction

The introduction is the first chance for players to familiarize themselves with the new world they are occupying. It is the space where you define what is important, what they need to know, and how you will proceed. The introduction should be practiced and contain enough information without giving away too much. Appendix A provides an exemplary script of the introduction to the game.

It is not essential that you use exactly what is included here – you know your audience best, and you may find that they need more or less information depending on the context and their background. As you adjust the introduction to your audience, keep in mind that there is a limit to how much new information someone can take up at once. It is fine to move relatively quickly to the gameplay itself. Players will receive additional in-game instructions which will guide them step by step. Be prepared to answer their questions throughout the simulation.

We propose this general structure for the introduction:

- A short overview of the key parts of the workshop (introduction, simulation, debriefing, survey);
- Your aim in playing the simulation - this may differ depending on the group you are playing the simulation with;
- A short introduction to social simulations;
- A short introduction to the rules of the simulation; and
- A short introduction to the game flow.

### Before you start the simulation:

#### 1. Ask if there are any questions

It is good practice to check with the participants if they understood everything. You may encourage players to ask/write down questions even before the end of the introduction of the game rules and world? When participants ask for elements that will be explained later - be polite but tell them that it will come up later.

#### 2. Establish communication channels

Players might be confused about how to communicate with other participants. Should they talk through a simulation? Or should they use the teleconference chat (during online

workshops?). When doing the introduction in an online workshop, have players join a teleconference. They can hear your voice and see your screen as you lead the introduction. Encourage participants to turn on their cameras when possible.

### 3. Create breakout rooms

If you want to give players a chance to discuss their actions per voice chat, create breakout rooms in a number of organizations in the simulation. You can also rename the breakout rooms so it's easier to operate. Before you open the breakout rooms, you need to give participants a clear announcement on what will happen next and how it will affect the communication.

## 7.2 Gameflow

The PHUSICOS simulation was prepared to be played via 13 rounds. However, you can accelerate the game by skipping some of these rounds in order to fit your timeframe. In this particular simulation, moderators can manage and influence what players are seeing and when. Depending on players' decisions, moderators can send players additional information that would directly answer to what has happened in the Phusicos region.

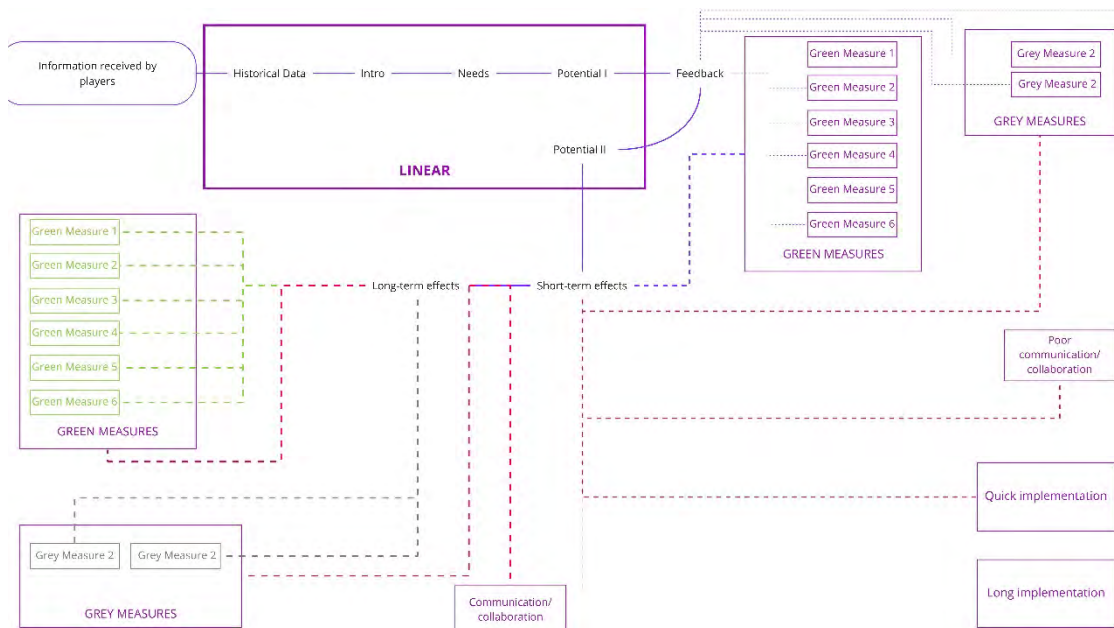


Figure 18: Information flow in the PHUSICOS simulation. Moderator starts with sharing linear information, and then depending on players' decisions, shares posts tailored to the situation.

To focus players' attention, moderators can also redirect players to specific places in the Phusicos region. The moderator interface is explained in section 4.1.3. Any moderator can slightly adjust the game flow to fit within the context of their workshop.

### Round 0 (around 10 minutes, shorten/extend time accordingly):

**JANUARY (around 10 minutes, shorten/extend time accordingly)**  
**FEBRUARY (around 10 minutes, shorten/extend time accordingly)**  
**MARCH (around 10 minutes, shorten/extend time accordingly)**  
**APRIL (around 10 minutes, shorten/extend time accordingly)**  
**MAY (around 10 minutes, shorten/extend time accordingly)**  
**JUNE (around 10 minutes, shorten/extend time accordingly)**  
**JULY (around 10 minutes, shorten/extend time accordingly)**  
**AUGUST (around 5 minutes, shorten/extend time accordingly)**  
**SEPTEMBER (around 5 minutes, shorten/extend time accordingly)**  
**OCTOBER (around 10 minutes, shorten/extend time accordingly)**  
**NOVEMBER (around 10 minutes, shorten/extend time accordingly)**  
**DECEMBER (around 10 minutes, shorten/extend time accordingly)**  
**THE FUTURE (around 10 minutes, shorten/extend time accordingly)**  
**DEBRIEFING**

Appendix B provides a more detailed gameflow.

### 7.3 Debriefing

The debriefing provides players the opportunity to reflect on what they did, why they did it and what it meant. It also provides time for bridging the gap between the game's world and reality. We have a tendency in running workshops to let participants play a little longer when they're having fun and cut the debriefing short. This is a mistake. The debriefing is the time when we close the experiential learning cycle. Finding a solution in the simulation is not enough. Without reflection and abstract conceptualization, we are not able to understand why the solution was chosen or how it could be modified to be even more effective.

Debriefing can take place simply through the simulation itself. As a moderator you also have the access to the chat, and you already have players split in the groups. You can use it to ask a few simple questions about the results of the simulation.

To continue with the debriefing, you can simply use conference software, or you can use another method, for example virtual whiteboard. For the face-to-face workshop you can discuss the outcomes of the simulation while being seated in a circle or work in groups with a flipchart. In choosing your method of organizing the debriefing, please take the following things into consideration:

- Number of players: The more participants there are, the more difficult it will be for you to ask questions in plenary; and
- Familiarity of the software: If the participants do not know the software you want to use for the game, bear in mind that you will have to explain and introduce it during the workshop. No matter the technique, there are a few important rules to follow in a debriefing.
- Make sure the participants' attention is on you: Players should be following your announcements throughout the game.

## Prepare to ask questions

Did you observe the players? Great, you can now use your observations to engage players in the Debriefing. Try to engage participants by asking questions, e.g., how they feel they are doing, what challenges they encountered and more.

## Prepare to answer questions

In the Debriefing, players will often ask: **WHY?** They might be confused about some of the results. Depending on the question, you might want to answer them yourself or redirect them towards other participants (table 5).

Table 5: Debriefing overview

Phase	Topic	Discussion points	Format
What?	Results Overview	⇒Quick overview of what happened ⇒Map ⇒Role-by-role	Moderator > Whole group
So What? Part 1	Reflection on the simulation experience	⇒Goals ⇒Challenges ⇒Relationships with other roles ⇒Interlinkages in the systems	Small-group discussion
So What? Part 2	Plenary	Summary	Participants > Whole group
Now What? Part 1	Bridging with Real World	⇒Connections between game world and real world ⇒Trade-offs and synergies in the real world ⇒Effective and ineffective solutions and approaches to problem-solving	Small-group discussion
Now What? Part 2	Plenary	Summary	Participants > Whole group
Evaluation	Individual reflection	⇒Lessons learned ⇒Game survey	Individual

## Examples of debriefing questions

### What?

- What DRR solutions did players invest in?
- Where did they see growth?
- What happened?

### So What?

#### Goals:

- What was your role in the game?
- What goals were you able to achieve (in whole or in part)?

*Challenges:*

- What made the pursuit of your goal(s) difficult?
- Were there any particular situations that were challenging or frustrating?

*Cooperation:*

- What interconnections have you observed between you (your decisions) and other roles (their decisions)?
- How well did you work with other roles?

**Now What?**

*Similarities to the real world*

- What similarities have you observed between the game and the situation in your area?
- If you were to do the game again, would you do anything differently?
- What lessons learnt can you extract from playing the simulation?

*Inspirations*

- What inspirations did the game bring you to do differently / to initiate in your job/area?

## 7.4 Post-game survey

At the end of the simulation workshop, we ask you to share the simulation survey with the participants.

We encourage moderators to run this survey, as it will help us gather data on the players' game experience in order to understand what impact (if any) the PHUSICOS simulation had on the players. The simulation survey is in form of an online Google form document, and can be accessed [here](#). To make it easier, for moderators we embed the survey in the game in form of a link a moderator can send to players at the end of the session.

We invite simulation users to contact us in relation to research based on the post-game surveys. The following section summarises preliminary findings based on workshop records and survey responses.

## 8 Lessons learned from the PHUSICOS NBS Simulation

This section aims to consolidate and present the key insights and lessons that were gleaned from the simulation exercise. The lessons outlined in this section were derived from a combination of sources. These include the preliminary responses to surveys completed by participants after the simulation (9 responses) and observations made by the moderators during internal testing sessions (13 sessions) and external workshops (4 workshops with a total of 91 participants, as well as several testing sessions of different parts of the game with PHUSICOS partners and site owners). Participants to internal and external testing sessions were varied and included students, researchers, NGOs,



activists, designers and practitioners. The survey questions are included in Appendix D. The moderators recorded participant interactions, engagement levels, decision-making processes, and other behaviours, which were analysed alongside survey responses to produce a nuanced and comprehensive overview of the PHUSICOS NBS simulation experience. It is important to note that the data gathered through the post-simulation survey was limited as participants often chose to end the game without answering it. As the prompt to fill out the survey is a permanent feature of the simulation, we hope that more data will be gathered in the future as the game gets played. Additionally, the pool of participants and the context of each workshop varied, meaning that the responses may not fully represent a comprehensive range of experiences and perspectives. Despite this, the feedback gathered offers a valuable snapshot into the participant experience during the PHUSICOS NBS Simulation.

Here, we aim to present these lessons in a structured and coherent manner, shedding light on both the strengths and areas for improvement within the PHUSICOS NBS Simulation. The lessons learned have and will continue to serve as an invaluable resource for furthering the understanding of NBS governance and the continued refinement of the simulation tool itself.

## 8.1 Engagement, leadership and decision-making

In terms of participant engagement, the simulation was generally received positively by the participants, with the majority (67%) agreeing or strongly agreeing that the simulation was enjoyable, helped them understand the complexity of the underlying system, and stimulated knowledge sharing (Q8, figure 19).

Indicate your agreement or disagreement with the following statements. In your opinion, the PHUSICOS simulation ...

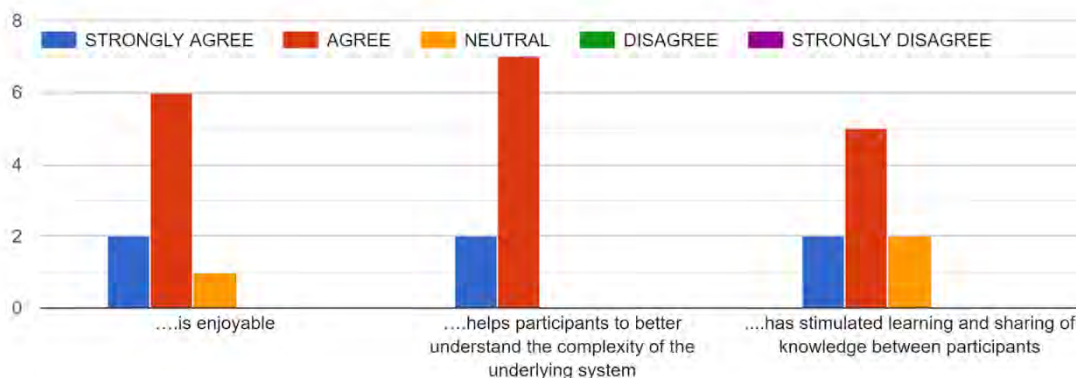


Figure 19: Answers to survey question 8 on the general gameplay experience

Despite positive engagement, responses to Question 18 indicate a variance in the degree to which a common understanding of the challenges in the Phusicos region was

achieved. A substantial proportion of participants (67%) felt that they achieved only "A little" or "Moderately" in terms of common understanding of these challenges (Q18, figure 20).

In your opinion, did you achieve a common understanding of the challenges in the Phusicos region?  
9 responses

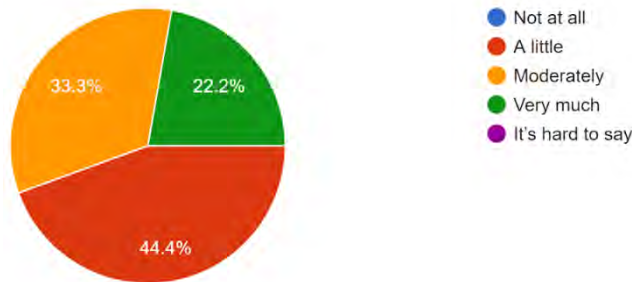


Figure 20: Answers to survey question 18 on the understanding of challenges portrayed in the game

The leadership during the simulation was perceived differently by various participants, with different organisations being identified as taking a leadership position (Q11). The actions and focus of these leaders varied from “biodiversity” to “green investments” and “stopping capitalism” (Q12). Conflicts were commonly observed during the gameplay (Q15), often centred around different priorities of actors and how to allocate funds (Q16) (figure 21).

Did you observe any conflicts during the gameplay?  
9 responses

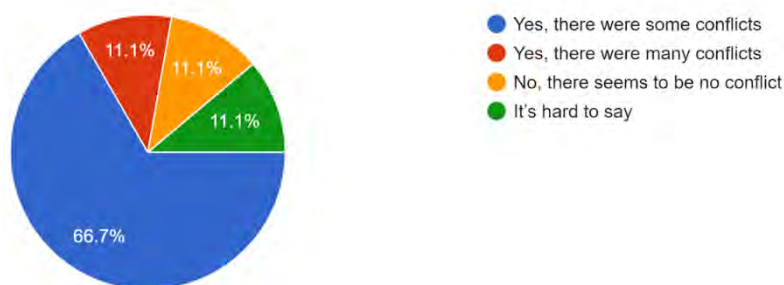


Figure 21: Answers to question 15 on conflicts observed during the game

Yet, the survey responses reveal that participants were willing to compromise, but the extent and nature of these compromises varied (Q20, Q21). Participants used multilateral channels primarily to reach agreements and discuss different disaster risk reduction options, but some also employed bilateral and internal feeds (Q22).

The most important individual decision drivers among participants included the actor’s mandate (as defined in the game), vetoes used by other actors, biodiversity concerns and available budget (Q23). Responses indicate that the groups’ decisions were influenced by various end goals, including disaster risk reduction, biodiversity and budget savings, and individual goals (Q24). Explicit agreements on established solutions were relatively rare, and when agreements did happen, they were often between smaller subsets of participants or were implicit rather than explicit (Q19).

In your opinion, did the participants come to agreement in regards to established solutions?  
9 responses

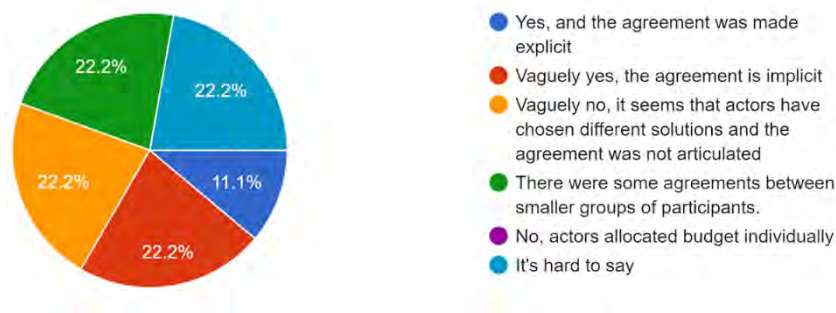


Figure 22: Answers to question 19 on agreement on the final solutions picked in the game

## 8.2 Constraints and challenges

A consistent challenge for individual decision-making, as identified by participants (50%), were financial constraints (Q25). Vetoes, or the ability of some players to block certain decisions, were cited as significant challenges in both individual and group decision-making contexts (Q25).

Different perspectives and views on solutions made group decision-making challenging. Participants often found it difficult to agree on compromises and to reallocate money from (perceived) higher priority measures (Q25).

In terms of structural and procedural challenges, time constraints emerged as a specific challenge for 22 % of respondents, indicating that participants may have felt pressured to make decisions within a limited timeframe (Q25). Several participants cited specific game mechanisms—such as vetoes and funding limitations—as significant challenges in both individual and group decision-making (Q25). Reading and assimilating all the inputs (feeds, news) from the game was also indicated as a challenge (Q25). Simplifying and streamlining the information flow, and possibly reducing the reading requirements, were suggested as potential improvements (Q36, Q40).

Likewise, the requirements of the simulation were noted as a challenge for some participants (22%), suggesting that the rules or goals of the simulation may not have been clear to all players, or that they may have felt too restrictive (Q25).

### 8.3 Learning insights and knowledge acquisition

The majority of participants (56%) agreed that the issues represented in the game reflect the challenges associated with NBS implementation (Q27). Participants felt that they gained insights into the decision-making processes involved in NBS implementation (Q33) - “multi funding schemes, different stakeholders, downstream solutions are nice but not necessarily helpful for the goal, city solutions!!!”; “[I gained] insight in the decision-making processes”. The game also provided a better understanding of the complexity of financing and interacting with diverse stakeholders to implement NBS (Q33): “great to see different roles in detail and conflicts of interest with one single role”. Participants specifically learnt about the diversity of opinions among stakeholders and the challenges of finding solutions that satisfy everyone (Q33): “[I learned about] the different opinions of the stakeholders and how hard it is to make everyone happy”. Respondents noted that certain groups (e.g., in the simulations’ case, farmers) can be particularly difficult to work with due to their steadfast positions (Q33): “Farmers are stubborn” (figure 23).

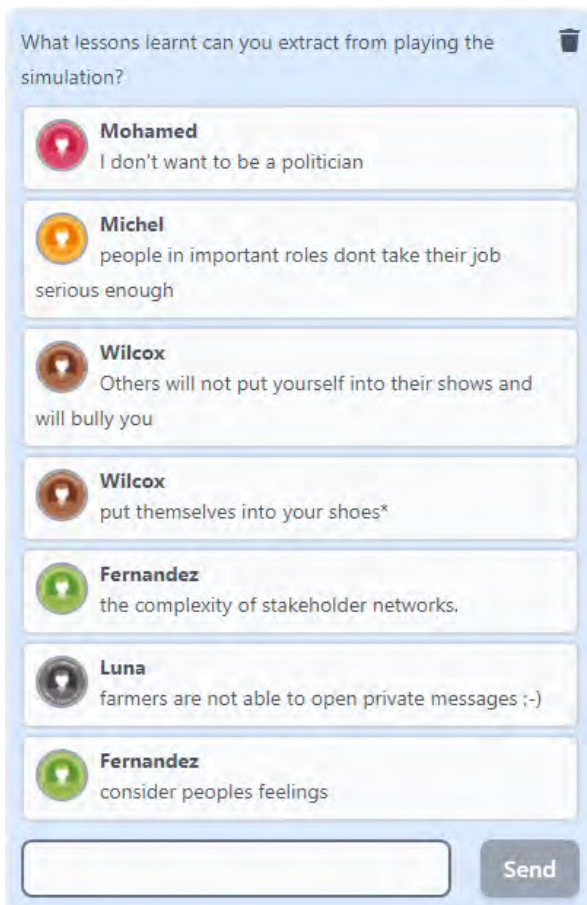


Figure 23: Screenshot of players' conversation on the game's lessons learnt

When asked whether the simulation improved their understanding of NBS, their co-benefits, trade-offs, and governance, participants' responses varied. Yet, there was a general agreement that the simulation helped them gain insights into NBS implementation and its associated challenges, especially potential conflicts that can arise during the decision-making process (Q28-Q32).

## 8.4 Game design feedback

Most participants (67%) found it easy to accomplish tasks in the simulation and were satisfied with the guidance provided. However, some participants experienced difficulty, suggesting that the instructions and support information could be clarified and enhanced (Q35, Q36). Besides, participants praised the graphic design, which was highlighted as a strength of the game. This indicates that visually engaging elements contribute to the effectiveness of the simulation (Q37, figure 24).

Indicate your agreement or disagreement with the following statements

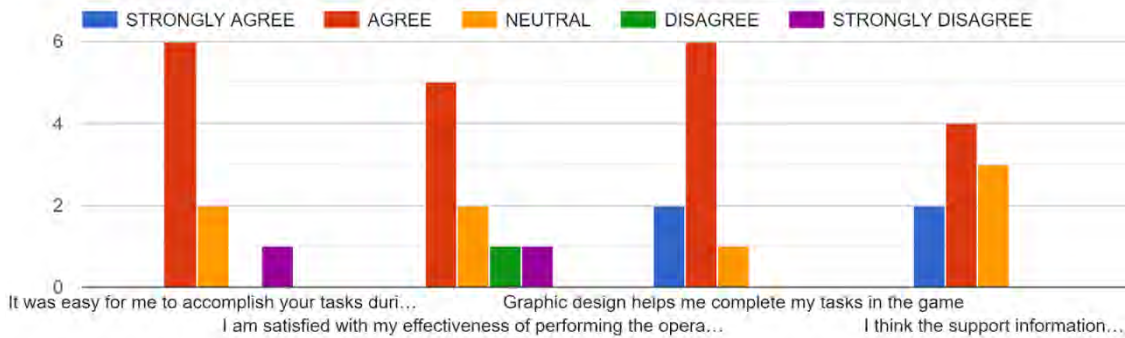


Figure 24: Answers to questions 35-38 on the simulation design

Participants also suggested improvements to the game, such as more streamlined information flows and better ways to signal new incoming messages (figure 25). A more logical organization of posts in the city hall feeds was also suggested. Some respondents also indicated a desire for more consequential interactions within these feeds (Q40). One participant suggested clearer guidance on the importance of picking a given actor to play in the simulation, as lack of role adherence led to missed conflict avoidance opportunities. This suggests a need for clearer instructions on mandate and responsibilities of each actor (Q41).

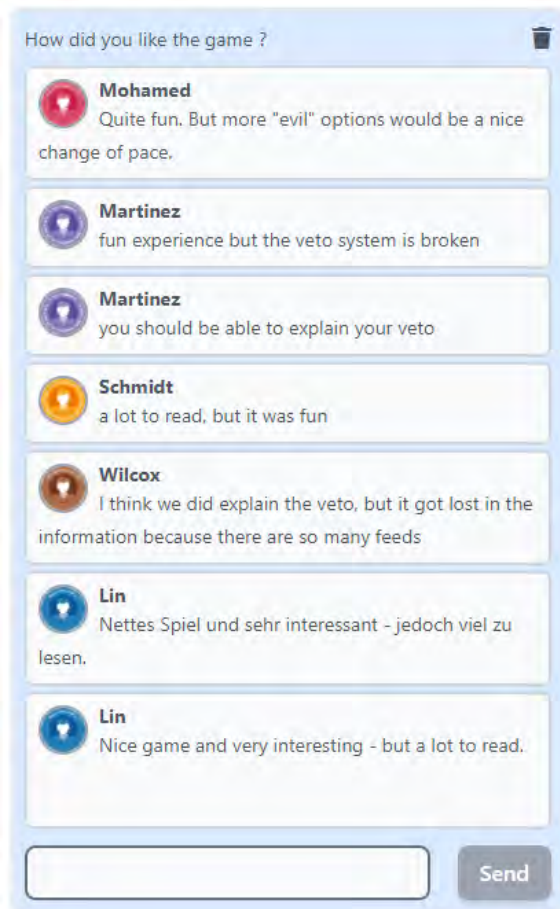


Figure 25: Screenshot of players' conversation on impressions of the game

Participants also expressed the need for more diverse disaster risk reduction options, particularly for grey/ hybrid solutions and options for entrepreneurs (figure 25). This suggests a need for more nuanced and varied decision-making paths in the game (Q40).

Finally, in terms of the general game experience, 89% of participants expressed their satisfaction with the game, as also reflected in the appreciative comments received. This positive feedback suggests that the game can be a valuable tool for education and research on NBS (Q41).

## 8.5 Conclusions

The lessons learned from the PHUSICOS NBS Simulation provide important insights into participant engagement, decision-making dynamics, negotiation processes, and the overall effectiveness of the simulation as a tool for understanding and implementing NBS. Participants generally found the simulation to be engaging and informative, shedding light on the complexities of NBS governance and the diversity of stakeholder perspectives. However, the data also highlights areas for improvement, including clarifying the simulation's objectives, refining game mechanisms like vetoes and funding constraints, and addressing the variance in participants' understanding of the

challenges within the Phusicos region. Additionally, the simulation's design and user experience were generally well-received, but participants' feedback suggests the potential for further refinement to enhance clarity, usability, and engagement.

Our findings help identify key factors that foster collaboration and effective communication among various stakeholders, essential components for successful NBS governance. Understanding the learning outcomes enables us to pinpoint how the simulation enhances participants' comprehension of NBS implementation, governance structures, stakeholder dynamics, and decision-making processes, thereby informing education and training strategies for actual NBS projects. By identifying challenges and constraints, our lessons learnt contribute to a deeper understanding of the real-world obstacles that NBS projects may encounter, guiding the development of strategies to navigate these challenges in governance contexts. The evaluation of design and user experience provides insights into how to create more effective, user-friendly, and engaging simulation tools, which can be used for training and capacity-building among NBS practitioners and policymakers. Lastly, deriving insights for real-world application ensures that the lessons from the simulation are not just theoretical but can actively inform and improve the design, planning, and governance strategies of actual NBS initiatives. In this way, the lessons learned are not just a reflection of the simulation experience but are also a bridge to enhanced real-world governance and implementation of nature-based solutions.

We encourage all moderators involved in the PHUSICOS NBS Simulation workshops to contribute their observations and insights to this research. Your unique perspective on participant interactions, decision-making processes, and engagement levels will be invaluable in refining the simulation tool and enhancing its capacity to educate and inform real-world NBS governance strategies. Please share your experiences and help us continue to improve this important initiative.

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# Appendix A: Introduction Script

## **Your aim in organizing the workshop:**

### **Aim:**

Thank you for joining me today. My name is... [Introduction of the moderator]. The main point of today's workshop is to play the PHUSICOS simulation, a multiplayer browser-based social simulation about disaster risk reduction through grey and green solutions. The simulation was originally developed for the PHUSICOS project with HORIZON2020 financial support. Our aim for that is to.... [your goal for organizing the workshop].

## **A short introduction to social simulations:**

### **Definition:**

Before we go into details on how the gameplay will look like, let's start with the basics. What exactly is a social simulation? Social simulation is an experiential process where a group of participants collectively explore a complex reality. It is similar to a multiplayer serious game, as it uses many game-like mechanics, but it also resembles interactive theatre by being open-ended in that it does not press participants to achieve any specific goals.

### **Limited Reality:**

We work in a limited reality. Essential elements of the real world are represented, but not everything can be. Experts on individual aspects of the game may find them oversimplified; others may find it too rich with details. But the goal was to represent the full system in the best way possible, even if it meant sacrificing specific details.

### **'No winners, no losers':**

Even though we sometimes call this a game, there are no winners or losers in social simulations - there is no 'ultimate' goal, for example, the most points, the most money, etc. The main aim is to learn how to manage complex situations.

### **No set goals:**

Moderator doesn't set your individual goals. You as players set your own goals and priorities in your roles. There are some general tasks you need to accomplish. How you are going to do this is up to you.

### **Debriefing:**

Finally, at the end of the game, we will have a debriefing, which is critical to reflecting on what happened in the game and how it might relate to the real-world model it's based on. So, what are the rules of the game?

## **A short introduction to the rules of a social simulation**

### **Ground rules:**

We will set some ground rules to ensure that we are operating in a safe environment:

- One person speaks at a time

- You may ask questions to clarify ideas
- Always criticize others in a careful, respectful and constructive manner
- Feelings may be expressed; they should not be rejected or denied
- If anyone feels uncomfortable at any point during the simulation, we can stop the game and discuss/solve the issue

### **Magic circle:**

In order to create a safe space, we operate in the so-called 'magic circle'. You will take on a specific role in the game. In that role, you may do things which you would normally do, or which you would not. What happens in the game is part of the game. Once we finish it, we actively step out of the magic circle and go back to being friends.

### **Time is limited:**

The biggest pressure you will feel is time. Just as we have pressing crises that need our attention in our world, we must set deadlines in the game.

### **Listen to announcements:**

You must listen to announcements. They can contain information relevant to the action or have other effects.

### **Complexity and uncertainty:**

Don't worry! There is a lot of information at the beginning, but it will all make sense with time. You'll get information just-in-time - ask questions if you're curious, but don't be surprised if the moderator gives you an answer like 'We'll get to that in a moment.'

### **Feedback:**

If you have feedback about the game, or something that happened, please save it till the debriefing.

### **A short introduction to the PHUSICOS setting:**

#### **PHUSICOS region:**

Let's learn more about the simulation itself. As mentioned before, the simulation takes place in a fictitious PHUSICOS region, which bears some resemblance to different places around the world.

#### **12 Months:**

You will have 12 months fitted into approximately. [real time you want to spend on the game, we usually take 1 hour] to decide on your priorities and selecting from proposed solutions for disaster risk reduction that would be appropriate for the region.

#### **Log in:**

We will start with you choosing your roles and logging into the game. You will become members or employees of important organizations that have stakes in the region. Please select the roles that ... [feel close to you/what you do in real life; you might not feel comfortable with - you might gain some additional insights on different perspectives].

**Instructions:**

I hope that you are all logged in already. Here is a short overview of the interface. [overview with shared screen or presentation: interface elements: Avatar, Organizations, Headquarter, Budget, Time, Chats, Projects].

**Just-in-time instructions:**

You will receive more details about the PHUSICOS region and its problems during the next 12 month. Keep a close watch on the month at the top left of your screen and at the red notifications about new messages to follow additional just in-time instructions.

**Guidance:**

At any point of the simulation, you can ask questions or write comments on the chat in [specify the channel of communication]. I might not answer immediately but I promise to address them at some point. I will use voice chat to guide you further through the simulation and I might use the simulation options to bring you to a specific windows within the simulation.

# Appendix B: Detailed Gameflow

## Before the simulation starts

Before the workshop starts:

- Check if you have the right link to the simulation session
- Block voting option

Just before you start the game:

- Make sure that everyone logged in

## INTRO

(around 10 minutes, shorten/extend time accordingly):

- Moderator posts Intro post package.
- Moderator announces that players will be redirected to the Tutorial.
- Moderator redirects players to the Tutorial
- *Players read the instructions* (around 2 minutes, shorten/extend time accordingly). -> At the same time, moderator shows the hidden headquarters (ASSETS).
- Moderator announces that players will be redirected to the Headquarters.
- Moderator redirects players to their respective Headquarters.
- *Players read the description of their organizations* (around 2 minutes, shorten/extend time accordingly).
- Moderator announces that players will be redirected to the Internal Chats.
- Moderator redirects players to their respective Internal Chats.
- *Players meet they group mates and discuss general priorities of their organization* (around 5 minutes, shorten/extend time accordingly) -> At the same time, Moderator checks on the players' feeds to see how the introductions are going.

## JANUARY

(around 10 minutes, shorten/extend time accordingly)

- Moderator moves to the next phase.
- Moderator posts Historic Data post package.
- Moderator announces that players will be redirected to the City Archive.
- Moderator redirects players to their respective City Archive.
- *Players read historic news from the City Archive* (around 5 minutes, shorten/extend time accordingly).
- *Players read and comment on the posts*

## FEBRUARY

(around 10 minutes, shorten/extend time accordingly)

- Moderator moves to the next phase.
- Moderator announces that players will be redirected to the Internal Chats.
- Moderator redirects players to their respective Internal Chats.

- *Players meet their group mates and discuss general priorities of their organization (around 5 minutes, shorten/extend time accordingly) -> At the same time, Moderator shows all hidden projects. Moderator posts Exploring post package. Moderator checks on the players' feeds to see how the introductions are going.*
- *Players read new instructions, explore the map, read about the investments (around 5 minutes, shorten/extend time accordingly) -> If necessary, the moderator can redirect players to the Tutorial after posting the Exploring post package.*

## MARCH

(around 10 minutes, shorten/extend time accordingly)

- Moderator moves to the next phase.
- Moderator posts Needs package.
- *Players read new posts in the City Archive.*
- Moderator invites players to the public consultations on the specific topics.
- Moderator announces that players will be redirected to the Conference Centre.
- Moderator redirects players to Conference Centre.

## APRIL

(around 10 minutes, shorten/extend time accordingly)

- Moderator moves to the next phase.
- *Players discuss topics in two separate threads in the Conference Centre. (around 10 minutes, shorten/extend time accordingly) -> Moderator checks on the discussions to see how it's going. If necessary, the moderator can post supporting questions to guide the discussion.*

## MAY

(around 10 minutes, shorten/extend time accordingly)

- Moderator moves to the next phase.
- *Players discuss topics in two separate threads in the Conference Centre. (around 10 minutes, shorten/extend time accordingly) -> Moderator checks on the discussions to see how it's going.*
- Moderator unblocks the voting process
- Moderator posts Potential I package.
- *Players continue to explore the map and vote.*

## JUNE

(around 10 minutes, shorten/extend time accordingly)

- Moderator moves to the next phase.
- Moderator announces the end of the public consultations.
- Moderator posts instructions for Bilateral discussions.
- *Players read the instructions (around 2 minutes, shorten/extend time accordingly).*
- *Players discuss within their own organizations, and with other organizations.*

## JULY

(around 10 minutes, shorten/extend time accordingly)

- Moderator moves to the next phase.
- Moderator posts Feedback to the projects with high financial support.
- Moderator announces that the public reactions to the decision-makers decisions have been posted.
- *Players discuss within their own organizations, and with other organizations.*

## AUGUST

(around 5 minutes, shorten/extend time accordingly)

- Moderator moves to the next phase.
- Players continue to explore the map and vote.
- Players discuss within their own organizations, and with other organizations.

## SEPTEMBER

(around 5 minutes, shorten/extend time accordingly)

- Moderator moves to the next phase.
- Moderator blocks the voting process.
- Moderator post Potential II package.
- Moderator invites players to the General public consultations.
- Moderator announces that players will be redirected to the City Hall
- Moderator redirects players to the City Hall.

## OCTOBER

(around 10 minutes, shorten/extend time accordingly)

- Moderator moves to the next phase.
- *Players continue to discuss the investments in the City Hall*
- Moderator unblocks the voting process.

## NOVEMBER

(around 10 minutes, shorten/extend time accordingly)

- Moderator moves to the next phase.
- Moderator invites players to make last decisions before the investments are announced in December.

## DECEMBER

(around 10 minutes, shorten/extend time accordingly)

- Moderator moves to the next phase.
- Moderator posts Short-term feedback according to the results visible on the map.
- Moderator announces that players will be redirected to the City Archive.
- Moderator redirects players to the City Archive.
- *Players read historic news from the City Archive (around 5 minutes, shorten/extend time accordingly).*

## **THE FUTURE**

(around 10 minutes, shorten/extend time accordingly)

- Moderator moves to the next phase.
- Moderator posts Long-term feedback
- Moderator invites players to the City Hall for the final comments on the investments
- Moderator announces that players will be redirected to the City Hall
- Moderator redirects players to the City Hall.
- Moderator invites players to see the effects on the map

## **DEBRIEFING**

- Moderator posts Survey



# Appendix C: Player's instructions



**MAP ZOOM IN/OUT**  
Click to open the headquarter of your organization.

**YOUR AVATAR**  
Click to open the headquarter of your organization.

**YOUR NICKNAME**  
Novak  
2022  
May

**CURRENT PHASE OF THE GAME**  
Budget 1500

**BUDGET OF YOUR ORGANIZATION**  
You share it with other members of your organization. It's updated in real-time upon actions of you and other members of your organization.

**YOUR HEADQUARTER**  
Highlighted on the map.

**CONFERENCE CENTRE**  
Two big conferences - on flood and landslide risks - will be held here.

**CITY HALL**  
Check archive news here. Later in the year, you will also be invited to the Public Consultation about the investments in the region.

**DESCRIPTION**  
Read more about each organization.

**LOCAL GOVERNMENT INFRASTRUCTURE AND DEVELOPMENT**  
Local Government Infrastructure and development

**NEW MESSAGE**  
merrill dart

**HEADQUARTERS**  
Each organization has its own headquarter where you can contact it's members.

**FULLY FUNDED PROJECT**

**NEW FUNDS ADDED**

**PARTIALLY FUNDED PROJECT**

**POTENTIAL PROJECTS**  
This could be implemented in the region. Project will be implemented only when the required funding is provided. The final decision is made at the end of year. Until then you can change your mind and remove your support.  
Green hand icon = nature based solutions  
Grey hand icon = other solutions

**LOG OUT**  
It takes you out of the simulation. Don't log out, unless the moderator asks you to.

**LOG OUT**

**MAP OF THE PHUSICOS REGION**

**MESSAGE**  
Someone from this organization is switching to you.

**Members**  
Novak  
Martinez  
Varga

**ORGANIZATION MEMBERS**  
Check who else joins you in your organization.

**RIGHT PANEL: HEADQUARTER VIEW**

**PHUSICOS SIMULATION - INSTRUCTIONS**

The Department of Infrastructure and Development is responsible for local infrastructure and the collaboration with county-level administration. The department has to take into consideration the costs of maintenance of the infrastructure and how fast the investments can be implemented to achieve results. In the past, the department was criticized for some of the investments in the area and the scaling of some risk reduction measures. This caused some conflicts with Civil Protection Agencies and local communities. On one hand, the region needs investments to boost the local economy (construction, hospitality, etc.) and this requires land.



# Appendix D: post-simulation survey

## DEMOGRAPHICS

1. Age group (choice):
  - Under 18
  - 18-24
  - 25-34
  - 35-44
  - 45-54
  - 55-64
  - Above 64
2. Gender (male, female, other, prefer to not disclose):
  - female
  - male
  - Prefer to not disclose
  - Prefer to self-describe:
3. What is your area of work? (choice)
  - Research
  - Government
  - Local authority Administration
  - Business
  - NGO
  - Student
  - Other (please specify):

## GENERAL

4. When did you play it (calendar)
5. Where did you play it (short text)
6. What was your role (organization) within the simulation (choice)
  - Local Government: infrastructure and development
  - Local Government: environment and tourism development
  - Local Government: Civil Protection Agency
  - National Civil Protection Agency
  - Ministry of Environment and National Park
  - River Basin Authority
  - Local Entrepreneurs Group
  - Local Farmers Collective
  - Environmental NGO
7. Your surname within the simulation (short text)
8. In your opinion, the PHUSICOS simulation...(please indicate your agreement or disagreement with the following statements)
  - ...is enjoyable
  - ...helps participants to better understand the complexity of the underlying system
  - ...has stimulated learning and sharing of knowledge between participants

## LEADERSHIP

10. In your opinion, was there a clear leader among the players? From which organization?
- Yes, it was Local Government: infrastructure and development
  - Yes, it was Local Government: environment and tourism development
  - Yes, it was Local Government: Civil Protection Agency
  - Yes, it was National Civil Protection Agency
  - Yes, it was Ministry of Environment and National Park
  - Yes, it was River Basin Authority
  - Yes, Local Entrepreneurs Group
  - Yes, Local Farmers Collective
  - Yes, Environmental NGO
  - No, there seems to be no leader.
  - It's hard to say
11. What was the main focus of the leader? How was leadership put in practice (name specific actions)?

## INFORMATION SHARING

12. Indicate your agreement or disagreement with the following statement (strongly disagree -> strongly agree (STRONGLY AGREE; AGREE; NEUTRAL; DISAGREE; STRONGLY DISAGREE))
13. I've been sharing the information specific to for my role with other participants
14. I've been openly sharing my opinions on the challenges and solutions with other participants.

## COLLABORATION

15. Did you observe any conflicts during the gameplay?
- Yes, there were some conflicts
  - Yes, there were many conflicts
  - No, there seems to be no conflict
  - It's hard to say
16. If you answered "Yes" please describe them in more details
17. In your opinion, could all participants give their view on the problem and available solutions?
- Yes, they all said how they see the problem.
  - Discussion is dominated by one or few actors, many actors are ignored.
  - There is no discussion about the problem of the Phusicos region.
18. In your opinion, did you achieve a common understanding of the challenges in the Phusicos region?
- Not at all
  - a little
  - moderately
  - very much
  - it's hard to say

19. In your opinion, did the participants come to agreement in regards to established solutions?
- Yes, and the agreement was made explicit
  - Vaguely yes, the agreement is implicit
  - Vaguely no, it seems that actors have chosen different solutions and the agreement was not articulated
  - There were some agreements between smaller groups of participants.
  - No, actors allocated budget individually
  - It's hard to say
20. Did you make any compromises? If yes, what were they?
21. To what extent were you willing to compromise with others? Why?
22. What channels were used to reach agreements (multilateral, bilateral, internal feeds)?

### **DECISION MAKING**

23. What were your main drivers in making decisions?
24. What were the main drivers for the group?
25. In your opinion, what were the main challenges in making individual decisions?
26. In your opinion, what were the main challenges in making group decisions?

### **LESSONS LEARNED**

Indicate your agreement or disagreement with the following statements  
(strongly disagree -> strongly agree (STRONGLY AGREE; AGREE; NEUTRAL;  
DISAGREE; STRONGLY DISAGREE))

27. The issues represented in the game represent the challenges associated with NBS implementation
28. I have gained insights on NBS in general
29. I have gained insights on NBS co-benefits and trade-offs
30. I have gained insights on NBS governance
31. I gained insights on the different views on NBS
32. I have gained insights into the potential conflicts that can arise during the NBS decision making process
33. What are the benefits of the simulation? What have you learned from playing it?
34. Has this experience inspired you to think of any changes that you would like to introduce in the real world? If yes, please provide us with more details.

### **SIMULATION DESIGN**

Indicate your agreement or disagreement with the following statements  
(strongly disagree -> strongly agree (STRONGLY AGREE; AGREE; NEUTRAL;  
DISAGREE; STRONGLY DISAGREE))

35. It was easy for me to accomplish your tasks during the simulation

36. I am satisfied with my effectiveness of performing the operations in the game. There was enough time and generally, I knew what to do.
37. Graphic design helps me complete my tasks in the game.
38. I think the support information (instruction, moderator's clues) helps me to complete my tasks in the game.
39. Overall, you rate the user-friendliness of this game design (instructions, graphical interface) as:
- worst imaginable
  - awful
  - poor
  - ok
  - good
  - excellent
  - best imaginable
40. If you could enter the two most important improvements in the game, what would they be?
41. Do you have any additional comments you would like to share with us?