

# Serious games for sustainability transformations

## Participatory research methods for sustainability – toolkit #7

*Spurring societal transformations towards sustainability requires the active engagement of different actor groups with their broad range of preferences, interests and values. Individuals and communities need to acquire knowledge, skills, and capacities enabling them to navigate transformative change. Serious games can act as such capacity building tools but also as a feedback loop for research and policy processes.*

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**Serious games for sustainability transformations.** Participatory research methods for sustainability – toolkit #7  
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Serious games (SG) have emerged as celebrated tools with relevant potential to promote actor engagement and facilitate learning and knowledge integration for transitions towards more sustainable societies. They offer immersive and interactive learning experiences that enhance engagement and knowledge acquisition.

SG are engaging environments to explore and experiment with complex sustainability challenges by allowing players to grapple with real-world issues related to exploring different futures, climate change, resource management or planning. Through gameplay, players encounter complex challenges and are encouraged to experiment and learn from failures in a risk-free environment. Players can take on different roles and perspectives, gaining empathy and insight into the motivations and challenges faced by various actors in sustainability efforts. This understanding is expected to enhance dialogue and mutual understanding among involved actors by reflecting potential conflicts and enhancing cooperation. SG also encourage active engagement, as players can turn into co-creators of sustainability strategies and playfully co-create different approaches to solutions. By fostering actor engagement and collaboration, games serve as potential catalysts for building trust, partnerships, and individual and

collective agency for sustainability. While SG fulfil the characteristics of full-fledged games (figure 1, p. 294), gamified tools use isolated or sets of game-design elements to create playful or gameful experiences. Whether such experiences are called playful or gameful depends on the level of their rule-based nature (Deterding et al. 2011).

### Procedure

There is no one standard recipe to develop a SG, and sometimes it might be easier to adapt existing games for serious purposes (Castronova and Knowles 2015). Many SG developments are based on co-design approaches. The co-design of SG leverages the expertise of diverse actors and groups, including domain experts, citizens, policy makers, researchers and game designers. The involvement of such a diverse group should result in a versatile learning experience. It ensures a tailor-made approach catering into the players' needs, interests, preferences and values. There exist different frameworks and protocols that provide a basis to create SG or meaningful gameful environments (Silva 2019), typically including various steps:

**1 Set the game's target audience** with regard to age, gender(s), sociocultural background(s). Some game types and genres are more popular and suitable for specific age groups, learning styles and player types. It has proven beneficial to consider whether this target audience is a mixed group, that is, with different age groups or cultural backgrounds playing in separate groups or together. Considering these different group(s) influences the range of possible learning objectives and the adequate formats of educational game-contents.

**2 Outline the expected learning experience** on individual and/or collective level, which is an important step in the initial part of the (co-)design process. These experiences can aim at differ-

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ent goals, such as better knowledge of specific content or systems (e.g., cities, water catchment systems), skill development (negotiating, exchanging opinions, coalition building), reflection on civic action (civic learning), intergenerational exchange, experimentation and testing, questioning existing (mental) models and power structures or the co-development of plans. It is important to carefully select the envisioned learning experiences, because they must be translated and well anchored in the game design: if a broad variety of learning objectives are selected, the game becomes more complex, requires longer playtime and more time for design. During the game-activity gaming and interacting is in the forefront while learning happens in the background: for turning gaming experiences into tacit learning experiences, the debriefing is essential.

**3 Choose a game genre and create a game story** that aligns with the desired objectives. Game genres (e.g., adventure, strategy, role-playing, simulation games) influence the effectiveness of specific learning outcomes. Digital games offer real-time feedback and immersive experiences but require technical and programming expertise. Analog games provide low-tech accessibility, quicker prototyping, and face-to-face interaction. Crafting a resonating game story with relatable game characters, storylines and scenarios is vital for embedding the game in its sociocultural and geographical contexts and enhancing player immersion.

**4 Design the gameplay:** This step focuses on how players interact with the game and other players (multiplayer games). Game mechanics encompass players' interactions with rules and formal game properties, defining what players can do within the game and with other players and how this responds to their actions and decision-making during the gameplay. These mechanics drive and organize the game in the background. Basic game mechanics include, for example turns, levels, reward systems, resource management, progression, role-playing, time limits, and feedback systems. The selection and combination of game mechanics influence the game's enjoyment and educational value, and they undergo testing, iteration and adaptation during the design and play-testing process to achieve a balanced experience between learning and fun (Ampatzidou and Gugerell 2019).

**5 Design the debriefing:** Debriefing is the process in which players turn gaming into tacit learning experiences. Using games as experiential environments must be accompanied by a support structure that allows the players to connect the gaming experience with a broader real-world context and social practises (Crookall 2014). Debriefing actions can take different formats, and most of the times they include reflective actions on different levels: 1. reflection of the players' game activities and experiences; 2. the meaning of the gaming activities (interpretative), and 3. the meaning of the gaming activities in relation to the real-world, individual or collective social practises, potential futures, personal thoughts and conclusions. Hence, debriefing is an effort to put the gaming experience into context and reflect how different

game actions have produced the one or other result. For designing the debriefing, returning to the expected learning outcomes is beneficial.

**6 Play-testings are feedback loops** in the iterative design process. Game designers and players from the target audience play-test the game in different development phases. This provides valuable feedback to the design team, whether the game is well balanced (e.g., seriousness/fun, pace), the story and/or characters are a good fit, the game strategies and mechanics are working well together, and whether the game instructions, facilitation and debriefing sufficiently support the players and create meaningful gameplay.

## Skills and resources needed

**Time and budget:** Game design is a time-consuming and resource-intensive process. Having sufficient time and a suitable budget ensures that the development team can work effectively, iterate on designs, run co-design workshops, and deliver a game with meaningful experiences and an aesthetic and inspiring interface. Digital games might require additional budget for software, programming, licenses, etc.

**Game design expertise and skills:** Skilled game designers and developers are fundamental for the game development. They possess the technical expertise to translate the learning goals into interactive and engaging gameplay mechanics. Game designers create game structures, mechanics, and user experiences that are conducive to learning, and implement the technical aspects to make the game functional and immersive. The involvement of game designers, as a discipline in their own right, is essential to design effective SG.

**A facilitator** is relevant for analogue SG to ensure smooth gameplay, guide players through the gaming and debriefing process, and maintain engagement. The person facilitates discussions, clarifies concepts, helps participants to connect game experiences to the real-world and creates a supportive environment for meaningful gameplay and interactions among players.

## Strengths – weaknesses

**Engagement and motivation:** SG can be highly engaging and motivational. Unlike traditional learning methods, SG can provide a dynamic and enjoyable learning experience, which can boost participants' intrinsic motivation to actively explore, experiment, and problem-solve within the game environment.

**Power imbalances** within the co-design process can lead to certain stakeholders dominating the decision-making and design processes. This can result in the marginalization of certain actor





Games are **systems** where players engage in artificial conflicts.



Games are **artificial** systems that are not simulating the real world, they remain at least to some degree in the so-called magic circle.



Each game represents some sort of **conflict(s)** (over resources, decision making, etc.).

**Player(s)** actively engage with the game and/or other players and actively **take decisions**.



**Rules** provide structure and delineate how players can interact with the game and with other players.



WE NEED EACH OTHER  
**COMMONSPOLY**  
SO LET'S COOPERATE!

### GAME SHEET

This document is mainly for the Master. You can download more copies if needed at [www.commonspoly.cc/documentation](http://www.commonspoly.cc/documentation)

There are **20 rounds** in the game. You can keep track of which round you're on using the table below:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
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### DEFINE THE DEGREE OF DIFFICULTY

This is done by determining the privatisation levels and the number of Speculators. The less privatisation there is, the more Speculators there will be, and vice versa. Roll the dice once for each Good and write down the results. You should have a number between 4 and 24.

HEALTH GOODS	
HEALTH GOODS	
KNOWLEDGE-BASED GOODS	
ENVIRONMENTAL GOODS	
<b>TOTAL</b>	

This sum will define the **Degree of Difficulty** and the number of **Speculators**:

TOTAL SCORE	DIFFICULTY	SPECULATORS
4 - 10	Mad Max	1
11 - 17	Transition	2
18 - 24	Commonsland	3

**S**

### SITUATION CARDS

**SITUATION**  
You throw batteries into the river.

**CONSEQUENCES**  
-2 Welfare Points.  
-2 Legitimacy Points.

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### PLAYER SHEET CAROLINA

**CHARACTER'S PROFILE**

- I am a Salvadorean domestic worker who fights for the labour rights of migrant women.
- I am a heterosexual, middle-class Latina.
- I am not a citizen.

**SKILL POINTS**

6 CARING	3 OCCUPYING	2 SHARING	1 REGENERATING
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**LEGITIMACY POINTS**      **WELFARE POINTS**

1€ POINTS	2€ POINTS	1€ POINT	2€ POINT
5€ POINTS		5€ POINT	

**FIGURE 1:** Two examples of serious games (SG) for sustainability transformations. As explained at the figure's top, "A game is a system in which players engage in an artificial conflict, defined by rules" (Salen and Zimmerman 2004, p. 81). The *SG MOBILITY SAFARI* (upper row), developed by PLAY!UC JPI Urban Europe-Project, is a board game addressing mobility and urban planning.<sup>a</sup> Subverting *Monopoly*, *COMMONSPOLY* (bottom row) emphasizes cultures of cooperation and scrutinizes the model of neoliberal privatization. The open source, role-based board game was developed by ZEMOS98 at the ZEMOS98hackcamp.<sup>b</sup>

<sup>a</sup> [https://play-uc.net/?page\\_id=514](https://play-uc.net/?page_id=514)

<sup>b</sup> Additional information and an open source DIY download version of the game (in English, Spanish, French, Portuguese) is available at <https://commonspoly.cc>.

perspectives, knowledge types or the reproduction of real-world power asymmetries in the game.

**Oversimplification:** SG might simplify complex issues to make them more accessible and understandable. However, this simplification can result in an oversimplification of real-world complexities, potentially leading to a superficial understanding and representation of the issues at hand.

**Too serious:** SG can become overly serious and risk being boring if they prioritize instructional content and learning at the expense of engaging gameplay and fun. Striking a balance between learning and enjoyable gameplay is crucial for maintaining players' interest and motivation.

**Transferability to real-world context:** One of the most significant challenges of SG is transferring skills, knowledge and experiences gained within the game to real-world contexts. While SG provide immersive and interactive learning experiences, the direct application and transferability of acquired knowledge and skills outside of the game environment still remains somewhat unclear.

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