



# Using serious games to promote risk awareness

## Abstract

Games can be used as an interactive educational method, where the learning goals are embedded into the game design. They provide an interactive experience to better understand complex and abstract topics in a simplified way. By breaking down key concepts in geo-hydrological risk, such as probability, uncertainty and risk reduction measures, and gamifying those into game elements, we can improve understanding of risk, hence promoting risk awareness. When designing a serious game, it is critical to think about the educational content, target audience, the learning principles and the medium. In The Human-Tech Nexus (HuT) Project, we have developed a card game that teaches high-schoolers about risk management and risk reduction.

## Key points

- Bring key concepts of a complex subject to life in an interactive way.
- Hands-on and immersive experiences improve learning.
- The best serious games teach you something – but are also fun to play!

## What are serious games?

Serious games are games with a primary goal other than entertainment (Djaouti et al., 2011). Mostly, the other primary goal is education and/or training. Games can be used as an interactive teaching method, where the learning goals are embedded into the game design. This works well because participants get involved in and actively think about a complex subject through play (Breuer & Bente, 2010). This way, they get hands-on experience on a simplified version of reality. Serious games can be in any form of traditional games: a table-top game, a role-playing game, or a digital game.

Despite their name, the best serious games are not only educational but must also be fun to play! Fun games are better able to grasp the attention of the audience, improving the learning experience.

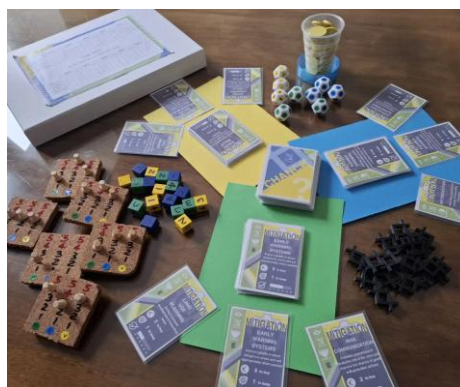


Figure 1: The 'Safe Haven' board game

## Why use games to teach about risk?

Even though we deal with risk on a day-to-day basis, the subject itself is complex as well as abstract. Breaking it down into concrete components and translating these into game elements helps to increase the understanding of risk, therefore promoting risk awareness.

Many concepts in risk understanding are consistent with gaming concepts, so the translation of one into the other flows naturally. One can think about

probabilities (realization of hazard intensities versus dice rolls), decision making (risk reduction strategies versus player options in a game), or uncertainty (unknowns in risk reduction strategies vs blind cards).

Lastly, games are a light-hearted way of learning about risk. Even though the subject itself may be heavy, this changes when dealing with an abstract version of reality. For example, surviving' and 'dying' in a game has a very different connotation, than when talking about such subjects in traditional education.

## From learning goals to game design

When designing a serious game, one has to think about four main aspects: (1) The primary educational content; (2) The target audience; (3) The primary learning principle; and (4) the medium (Breuer & Bente, 2010). The first two will guide the last two.

The primary educational content will guide much of the game design. One can take some key concepts of a topic and 'gamify' those. Is it factual knowledge that needs to be transferred (concepts / definitions), procedural understanding of the concepts or a systemic understanding?

Your audience is a guideline. While designing a game, one needs to think about who's the primary receiver of your game, but that doesn't mean the game will not be educational for anyone else. For example, we designed our game for high-schoolers, but we have heard positive feedback from risk experts too.

Examples of learning principles are trial and error, practicing skills, exploration, or problem solving. Typically, games make use of many principles at the same time. For example, there can be a notion of losing a life when a mistake has been made (trial and error) and information that is found on cards (exploration).



Figure 2: Playing the game with a high school audience

Lastly, the medium should be guided through the educational content, the expected audience, and the experience of the designer. It is never an end on its own, so it is best to go with something that is fitting, as well as achievable.

From personal experience we have one tip for anyone that thinks about designing a game: keep it simple. The goal of a serious game is to teach a message about its topic. A complex game not only takes longer to understand, but it may also reduce the learning outcomes, as mastering the game mechanics can become an end in itself rather than a means to learn.

### What is happening in the HuT?

The game 'Safe Haven' has been developed in the HuT Project and can be accessed here: <https://safehavengame.wordpress.com/>.

It is a card-based game that teaches players about risk management by taking the role of municipal decision makers. The overall purpose is to enhance risk awareness and promote understanding of risk. We have considered some elements related to risk that each contribute to the apprehension: (1) risk is a product of its three components: exposure, vulnerability and hazard. (2) Risk is probabilistic and the chances of a disaster are never zero. (3) There are certain risk reduction methods that work for hazard types and components. The interaction between these elements results in a more nuanced image of risk and lets players discover the complex interplay of factors influencing risk. We have implemented several versions, both as a board game and within an online platform, to address single hazards such as floods, landslides, heatwaves and forest fires, while we are going to release a multi-hazard version before the end of the project. We have played the game with 200+ persons in multiple countries (Italy, Germany, Spain) and with participants ranging from high-school students to risk experts.

### References

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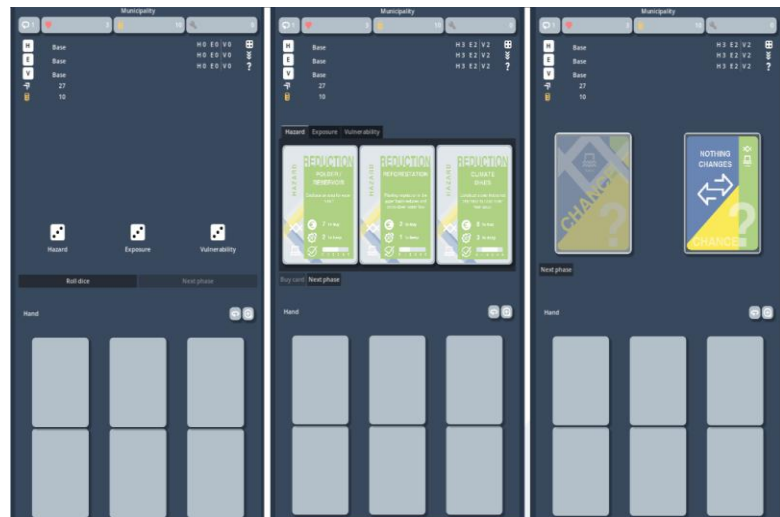


Figure 3: The 'Safe Haven' board game also has a digital variant.

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Learn more about The HuT project:  
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