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Serendipity and role-playing game in the Bolivian Altiplano: the *Sumak Kawsay* game to support local development reflection

Noémie Laborie¹, Marizol Flores², Matheo Thorin³, William's Daré¹ and Pierre Bommel¹.

1- French Agricultural Research Centre for International Development - Cirad,
Joint Research Unit SENS. Montpellier, France.

2- San Andres University, Chemical Sciences Department. La Paz, Bolivia.

3- Lorraine University, Mines Nancy. Nancy, France.

Abstract. We propose a methodology for the co-design of role-playing games based on the analysis of surprises, which refers to the concept of serendipity. Our objective is to understand to what extent the analysis of surprises in a role-playing game workshop reveals key mechanisms sometimes difficult to tackle by researchers-designers. Based on bibliography references, expert interviews about the socio-ecological context and participatory observations, we pre-designed a first version of a game that we modified and co-designed in participatory workshops in two communities of the central Altiplano in Bolivia.

We distinguish 3 types of surprises and different facilitator's behaviors in response to these surprises. While the first two types of surprises help to improve the game in the co-design process, the third type is more related to the socio-economic context. It reveals the importance of the diversification of activities in addition to the sole agricultural income and the dynamics of the population decline of rural communities.

We discuss the conditions to facilitate the occurrence of surprises: 1) the design of the game must allow the players freedom to modify and encourage acceptance as a model of their socio-ecosystem, 2) the facilitator must adopt a posture prepared to welcome them, and 3) the development of a climate of trust to free up speech. Finally, the analysis of surprises during the appropriation of the game and its intention by the players highlighted the rural exodus experienced by the Andean countryside, as well as the attachment of the inhabitants and migrants to the community.

Keywords: role-playing game, co-design, surprises, social transition, Bolivian Altiplano

1 Introduction

Participatory modelling started with the rise of participatory approaches in the 1970s. It includes a diversity of approaches that use modelling with stakeholders to help in the decision-making process and the co-adaptative governance of socio-ecosystems [1]. Companion modelling or ComMod [2-4] is a participatory modelling approach developed in the 2000s, concerned by the recognition of multiple stakeholder viewpoints and the manipulative potential of models. Practitioners so define ethical principles written in a deontological charter [5]. These ethical principles are: 1) to challenge in the field the assumptions on which the modelling is based, 2) to explicit all the hypothesis for more transparency, 3) to consider the impact of the research process on the field and 4) to be careful about the validation process of the research approach.

ComMod uses co-constructed simulation tools as mediating objects to produce knowledge on socio-ecosystems, to discuss, to share views and to help decision-making [6,7]. The favored tools are mainly agent-based models, and role-playing games. An agent-based model, or ABM, is a generally computerized model that simulate the actions and interactions of autonomous agents with each other and with their environment, in order to understand system-level dynamics. A role-playing game, or RPG, is a simulation game made up of material elements associated with a system of rules, which allows players to embody a character in a fictional environment. While

RPGs have been present since the early days of companion modelling, the term 'serious game' is now also used [8].

The 21st century is "*an era of games*" [9]. For the past two decades, games, and more specifically serious games, have been experiencing a boom. Serious games are defined as "*games that do not have entertainment, enjoyment or fun as their primary purpose*" [10]. We use the term in the broader sense in which it was first used [11] and in the French literature [12] even if today "serious game" often means video games [13]. While they were first developed in education [11,14], serious games are now present in a variety of sectors, from health to art by way of advertising [15,16] and cover a diversity of intentions. In the last 10 years, this enthusiasm has spread to research [8].

When talking about co-design in companion modelling, it is often the conceptual model that is co-constructed [17,18]. It then serves as a basis for the researchers to build the RPG or the ABM. This study distinguished itself by its original set-up. Our approach was to propose an uncompleted game based on basic information about the context from the start instead of initiating the project by co-designing the conceptual model and then implementing it in an RPG or in an ABM. The game and the underlying conceptual model were then co-constructed during the participatory sessions.

Literature mainly discusses the importance of early co-design of the simulation model [19], but little works are detailing the process of co-designing a role-playing game [20].

Co-design and knowledge integration processes are complex. When participants have different knowledge, customs and experiences, they may have difficulty understanding each other. In research for development, the integration of knowledge between traditional and scientific knowledge raises issues of power asymmetries and knowledge hierarchies. A ComMod approach should facilitate the mutual recognition of stakeholders' representations and their integration (including the researcher) without prioritizing one particular point of view.

Here, we propose a methodology for the co-design of RPGs based on the analysis of surprises. **Our objective is to understand to what extent the analysis of surprises in a role-playing game workshop reveals key mechanisms of the system studied, sometimes difficult to tackle by researchers-designers.** To do so, we rely on specific examples of the surprises that occurred during the game sessions.

The notion of surprise is to be understood from facilitators viewpoint as an unexpected event in the course of the game, often linked to an appropriation or diversion of the rules by the players. However, surprises are an opportunity for us to better understand the socio-ecosystem studied. The place given to surprises in the process of game co-designing refers to the concept of serendipity dear to Merton, for whom it is the observation of a surprising fact followed by a correct induction [21]. Surprises arouse the curiosity of researchers who, in this case, have preconceived a game by formulating a series of hypotheses based on their knowledge of the social-ecological system, that these surprises lead to re-questioning. They are potentially revealing elements of reality that are poorly or not considered in the game [22]. Despite their heuristic potential [23], surprises that may appear in game sessions are rarely studied. We differentiate them from the surprises or events intentionally introduced by the facilitators of a game session to characterize certain player learning, which have been more studied [14,24,25].

2 Context of the study

The Bolivian Altiplano is a large arid plain located in the Andes at an average altitude of 3800m. For several decades, the Poopó Lake region on the central Altiplano has been undergoing major changes. Agriculture has intensified, notably with the quinoa boom in the south [26], but also with the development of livestock in the north [27].

Lake Poopó has dried up to the point of being declared a "disaster area" by the Bolivian government in 2016. Climate change plays a significant role in the desertification of the region. Indeed, it causes seasonal disruption, increased temperatures and evapotranspiration [28] in addition

to the impacts of agriculture and land use changes [29]. Finally, the El Niño and La Niña climate phenomena bring their respective consequences in terms of droughts or floods around Lake Poopó [30]. Although the level of the lake has experienced large inter- and intra-annual fluctuations and has dried up in the past [31], its current drying up is not only due to climate change, but mainly to anthropogenic actions: diversion of the Rio Mauri by Peru, increasing irrigation for agriculture, urban growth and mining [32] which modify the hydrology of the region.

This is compounded by the high salinity of the water due to the geological dynamics of this endoreic watershed [33]. In addition, the water is often contaminated by mining and urban centers activities [34]. Through irrigation, the mobilized water then contributes to soil contamination and salinization [35]. Faced with the accumulation of these difficulties, many families migrate, at least temporarily, to live or work in cities, abandoning rural communities [36].

3 Methodology: an inductive approach to co-designing serious games

The Wasaca project - founded by Agropolis International Fondation - aims to better specify the issues encountered in the area by seeking to imagine development paths with local actors. This work is based on a participatory, inductive and exploratory methodology of the Grounded Theory type (Reiter, 2013). Within the framework of a ComMod approach, we designed an RPG called *Sumak Kawsay* (Living Well in Quechua), in order to 1) support a participatory diagnosis of the Poopó Lake area and understand the main problems experienced by the farmers and breeders of the Altiplano, 2) refocus the research accordingly, validate its relevance and build its legitimacy with respect to local populations, and 3) imagine viable development scenarios with the Altiplano's farmers and breeders.

This work was carried out in two communities in the Altiplano, near Oruro and Lake Poopó (Fig. 1). A first version of the game was designed on the basis of knowledge gathered thanks to participant observations, report studies and expert advice. *Sumak Kawsay* is a board game representing a small community in which players decide on agricultural and livestock activities. It was tested with the NGO “Agua Sustentable” and the Technical University of Oruro. A martyrdom version was then proposed to both communities. We presented this version - already playable - to workshop participants as a game to be improved thanks to their feedbacks, during the play and the debriefing.

Fig. 1. Map of the location of the two communities (Source: Google Earth, adapted by the authors)



Two game workshops were conducted in each community between February and March 2022 gathering 24 players in total. These workshops brought together members of the committees of the irrigators' associations, local authorities and less notable members of the communities, mainly breeders and farmers. The participants were first selected by our local contact, the president of the water users' board of the *Desaguadero-Mauri* watershed. The second sessions were organised by the presidents of the committees of the irrigators' associations, at their initiative. They took place in the meeting rooms of both communities. A game session lasts about 3 hours, divided into 30 minutes of installation, presentation and explanation, 1 hour and half of game and 1 hour of debriefing.



Fig. 2. Photo of the first game workshop in Santa Maria on 19/02/2022

Afterwards, nine game evaluation interviews were conducted. All game sessions and interviews were recorded - using video when electricity was available - and transcribed.

4 Results

4.1 Description of the game *Sumak Kawsay*

Sumak Kawsay consists of a board on which are represented the land and farms of 6 farming families. One round represents one year and 4 rounds are planned for one game. The objective of the players is to feed their family at each round and to increase their level of satisfaction. Each family starts with 9 plots and an endowment. In each round, they must first build up or renew their herd and make investments: irrigation, barn, seeds... In a second step, the board is updated according to plant growth dynamics, which depend on rainfall and irrigation. In a third step, thanks to their plant production, families can feed their herd. In a fourth step, the animals reproduce and provide income. At the end of the round, each family checks whether it has been able to meet its needs of the year.

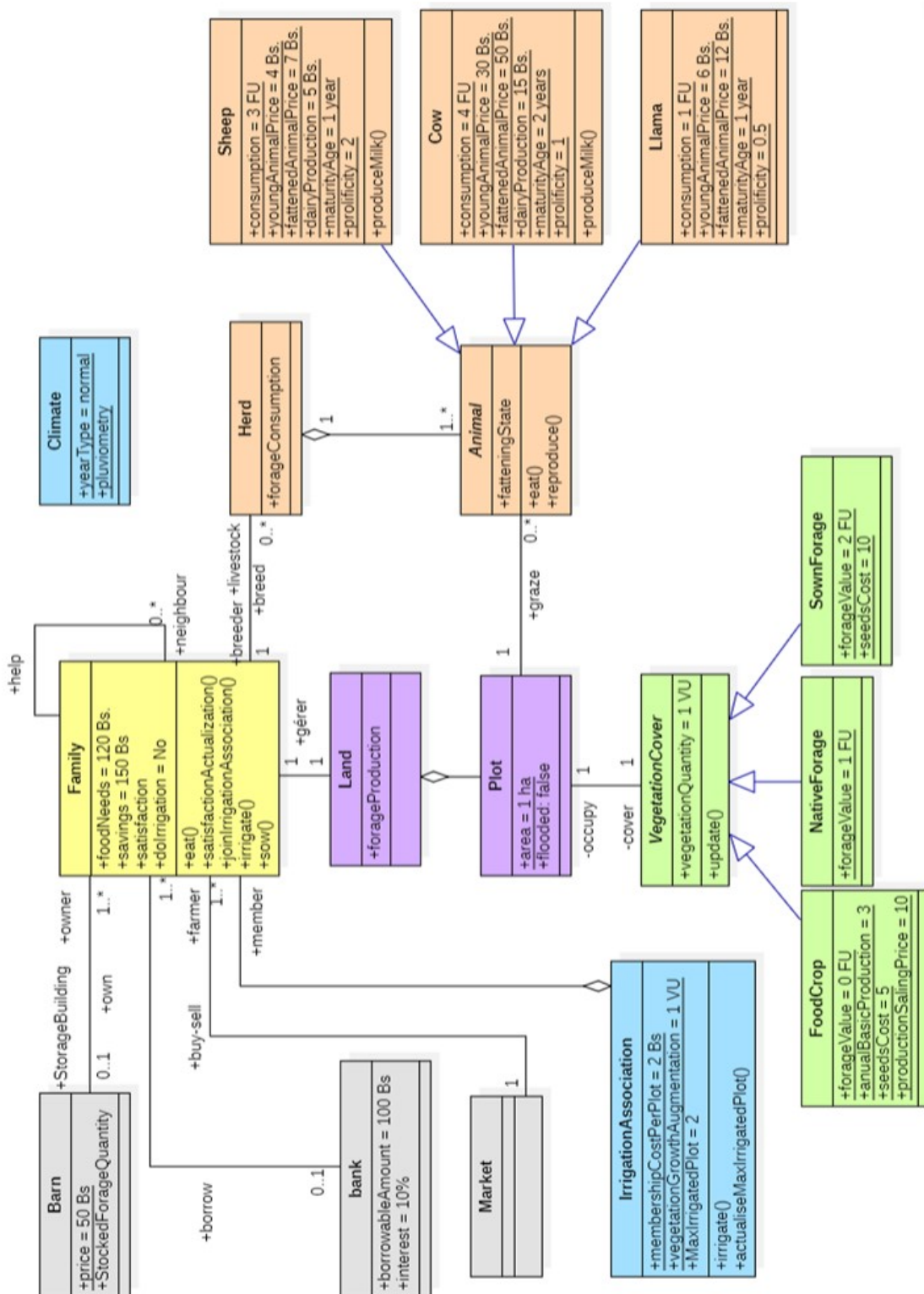


Fig. 3. UML class diagram of Sumak Kawsay's initial model.

The UML class diagram of the game is shown in Fig. 3 and the organization of a round and the help sheet in Fig. 4.

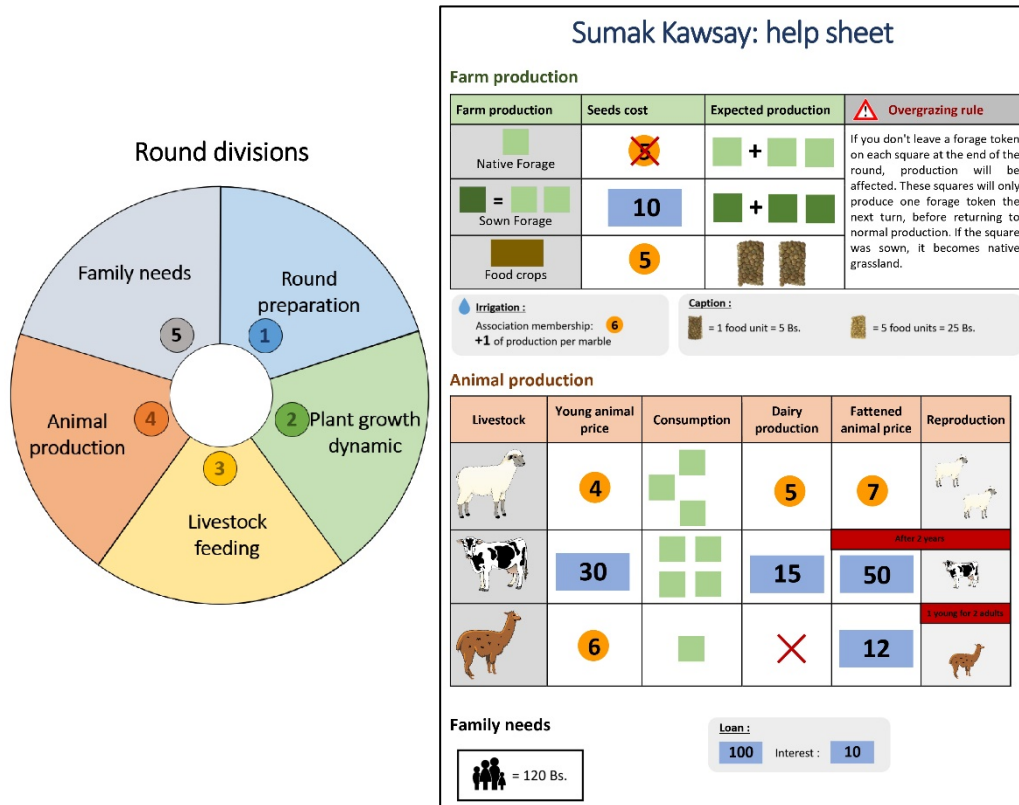


Fig. 4. (A) Organisation of a round and (B) *Sumak Kawsay* game help sheet

Events - planned by the facilitators - both individual and collective, social or natural, disrupt the game. The players can then reinvest the remaining money for the next round by buying animals for example, or by carrying out extra-agricultural activities such as studies for the children, the purchase of a house in town or a truck, according to the dynamics of pluri-activity and dual residence of these communities. To reflect the Bolivian context, exchanges between families are encouraged by events that require mutual aid or collective moments.

Besides a time on game improvement, the debriefing phase enables exchanges on the difficulties encountered, on the collective dynamics of the community and, at the family level, on strategies for subsistence and for improving livelihood conditions.

4.2 Surprises in the game

Not all the surprises are necessarily captured by the observation protocol. The role of the facilitator is therefore fundamental in allowing them to emerge during a game session. This means that the facilitation team members must be able to create an atmosphere of trust between themselves and the participants in the workshop. This is a prerequisite for the emergence of these surprises.

Surprises are discussed during the game if the opportunity and the need arise. If, however, the negotiation and rule change take too much time, we postpone it to the debriefing. During the workshops, the debriefings were a good moment for the players to say what was not realistic in the game and how to improve it. As much as possible, we tried to change rules during the game.

Changes that were too big or that were discussed in the debriefing were included in the game between two workshops.

We classified the surprises that appear in the course of the game into three types, supported by concrete examples and summarized in table 1.

Table 1. Classification of surprises and facilitator's reactions to their occurrence.

Types of surprise	Facilitator's reactions to the surprise	Examples
Misunderstanding or disagreement with a rule or a game mechanism	Helping the players	Feeding the animals
	Recalibration	Family consumption
	Removal of the responsible element	Removal of a pluriactivity card
	Changing the rules after discussion and negotiation	Reproduction dynamics of animals
Circumvention of the rules by one or more players	Letting it happen	Participation in kind in the maintenance of the canal
	Refusal and tightening of the rule	
	Modify the rule by completing it after discussion and negotiation	Purchase of a barn by several players: maximum 2 co-owners
Appropriation of the rules by a player and improvisation	Leave room for the player's expression	A player sells her animals at the end of the game to buy a truck, leave the rural community and become a businesswoman.
	Remind them of the framework of the rules	
	Discussion and negotiation of the decision and action on the game dynamics	A player buys a truck and asks for a work contract to diversify his activity.

1st Type: Misunderstanding or disagreement with a rule or a game mechanism

The target audience is not used to participating in role-playing games. The lack of understanding of the rules by the players often reveals that a game mechanism is too simplified or too far from reality. Disagreement can reveal a mis-simplification of the game. This type of surprise is therefore essential to consider for a better understanding of the system as it is designed by the stakeholders. However, there is a risk of being drawn into a game that is increasingly complex and close to reality. The more complex a game is, the more there is a risk of making it long and tedious, with a loss of the essential playfulness. This question of simplification or realism is recurrent in modelling [37]. It is particularly important to be addressed when the participation of stakeholders is sought.

For example, when the rules were explained during a session in Santa Maria, the players disagreed with the help sheet. It indicated that llamas eat 3 forage units of the game and sheep 2. We relied on various studies on sheep and cattle consumption [38,39]. Having found little work on the amount of forage consumed by llamas on the Altiplano, we assumed that the animal, being slightly larger than sheep, must consume more. One player, followed by the others, argued that the opposite was true. The llama eats little and has a very efficient metabolism. On the other hand, sheep are gluttons and eat three times as much as llamas. Together we changed the rules and the model of the game: now a sheep eats 3 and a llama 1.

2nd type: Circumvention of the rules by one or more players

Here, the rule is understood, but unlike the disagreement, the player does not oppose it head-on. He or she bypasses it. This circumvention in the game does not always reflect reality, but is more like taking advantage of a loophole in the rule system to gain an advantage in the game. If the

rule system really has a big flaw, players will not hesitate to use it in different game workshops. It is important to ask the participants about their actions in the game to find out if it is actually about taking advantage, or if their actions are realistic. It could be necessary then to complete the rule to run the game smoothly.

For example, in the game, building a barn is expensive, but it allows a player to store forage for several years. During a game session, two players start talking about buying a barn together and sharing its costs. The collective dynamic is interesting. There is no rule against buying together, nor is there a storage limit in the barn. The other players also want to participate in the purchase of the barn and share it. We asked if in reality barns are shared between several families and understood that they are not. We ended up negotiating and agreed on a new rule: a barn can only have a maximum of 2 co-owners.

3rd type: Appropriation of the rules by a player and improvisation

Beyond misunderstanding, disagreeing with or circumventing the rules, here the player disregards them. He or she no longer really plays within the rules of the game, but invents his or her own story and improvises. These surprises are the result of a certain eccentricity of some players. It only appeared twice, in two different workshops. Each time, the actions carried out were openly discussed by the other players, during the game and during the debriefing. As this was a case-by-case process, there were no rule changes.

Example 1: During the first session in Realenga, a player decided at the end of the game to sell all her animals except her llamas, to go and work in town and to become a businesswoman:

'Me, I want to sell all my cows, and I'm going to the city [...] I already have my house in the country, I want a truck to sell cattle, sheep and llamas. That's what I'm going to work with. Now I'm going to be a businesswoman.'

In the game, the city is not represented. There is a card for activities outside of farming and livestock, but these are more like side jobs that do not provide enough income to live on. Here, the action goes beyond pluriactivity as an additional income to remain living in the community. It expresses a desire to move to the city and leave the community to try one's luck elsewhere, to make a fortune and to experience social ascension. This action is illustrative of the rural exodus that communities of the Altiplano are experiencing. However, she chose to keep some llamas. This choice reveals the attachment to the community that the *residentes*, the people who work and live mainly in the city, maintain.

Example 2: In the first session in Santa Maria, a player bought a truck and asked for a contract to transport forage.

'Now I can have a contract, I have the truck [...] I want a transport contract.'

He refused to play the pluriactivity card and insisted on having this contract. After negotiating the salary so as not to distort the calibration of the game, the player drew up his work contract, which was signed by the facilitator (Fig. 5). This is the same pattern as before. Investing in a truck allows the player to go into business, earn more money, increase his standard of living and experience social ascension.

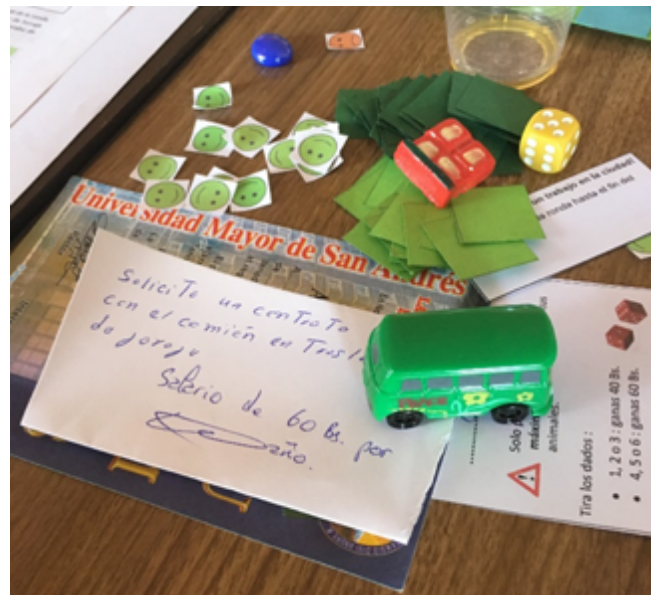


Fig. 5. Photo of the signed work contract and the lorry

In both sessions, these surprises made the other players laugh. However, during the round or later in the debriefing, these behaviors were criticized. In the first example, the leader explained that this was not the good strategy in his opinion and that it is necessary to invest in the country, in livestock, to create activity here. In the second example, several participants pointed out that there is very little transport here and the inhabitants live mainly from livestock.

4.3 The facilitator's postures to deal with surprises

Faced with these surprises, we, as facilitators, have had different reactions, also summarized in Table 1, that reveal different postures.

We have classified them into 4 categories according to the gradient of participation and consideration of the players' discourse.

1. Not allowing for or refusing surprise, for example by reminding the players of the rules. This is not a posture that was endorsed because we had an objective of co-construction and improvement of the game via trial and error cycles.
2. Providing help. Help is essential to accompany players through the game experience and to balance out differences in understanding between players. However, we do not really see it as a posture of openness to surprise. When we help a player, we encourage them to understand our model and our point of view, sometimes without trying to understand theirs, or the source of their misunderstanding. Conversely, when a player helps another player to understand the rules, it proves that the proposed model is at least understood by some players.
3. Removing the element that caused the surprise, often a misunderstanding or disagreement. There is no real discussion of the element in question, in order to make it understandable for all and to integrate it into the game in another way. This is done because of lack of time or because the element in question is too complex to change during the session.
4. Changing the rule after discussion and negotiation. These exchanges take place between facilitators and players, but especially between players, who discuss their different representations of the system. The validation of a new rule is therefore based on the

social control of the other players. This posture ensures a real co-construction of the game.

In addition to the surprises encountered in the game, which are related to the appropriation of the game by the players, we also encountered surprises in the appropriation of the game's intention by the players.

4.4 Surprises in the appropriation of the game's intention by the players

The initial intention of Sumak Kawsay

For the designers, the initial intention was to propose a game to revise and discuss a participatory territorial diagnosis and reorient the research according to the needs identified by the participants. The knowledge produced could then feed into a community project application to the municipality.

A game to learn how to make a living from agriculture and livestock?

However, participants from both communities saw the opportunity to use the game as a tool for "learning to invest", "managing a farm economically" and learning to "survive" in the Poopó Lake area.

A game to include youth?

Some leaders in both communities wanted to use the game with the youth of their community, with the objective of teaching them how to make a living from farming and livestock. This reveals their major concern: to prevent the exodus of young people. A version of the game desired by some could then be oriented to involve young people more in a transition of rural communities. The question then arises as to whether this demand should be met.

A bias in the game may have played a role here: in order to give participants as much choice as possible, they start the game with an endowment to build their herd and farm. In a way, each participant can be considered to be setting up at the beginning of the game. This initial configuration of the game may have inspired some leaders to use it with young people in order to convince them that a proper rural life was possible in the communities.

5 Perspectives and discussion

The surprise analysis approach presents several limitations. We will see the necessary conditions for the emergence of surprises and how to deal with the limitations. We will then see to what extent surprises can be indicative of transitions. Finally, we will consider the appropriation of the process by the stakeholders.

5.1 Limitations of a surprise analysis approach

This surprise analysis approach has several limitations. If initially we wanted to propose a very simple martyrdom version of the game so that the players would feel free to criticize it, improve it and make it their own, it is not easy to create a first uncomplex version.

The discussion of the rules and their modification in the game session can take time. There is a risk of breaking the game's atmosphere and making the participants bored. This is why some changes are made outside the session. When rules are changed during the session, there is always the risk of doing favors and creating injustice between players.

Finally, the analysis of surprises assumes that participants feel free to criticize and propose changes to the game, which is not always true, as we will discuss later. The following section suggests ways to address these limitations.

5.2 The necessary conditions for the emergence of surprises

In order to be interested in surprises and to study them, they must appear. Their appearance is encouraged by the design of the game and the posture of the facilitator, who must prepare for them and welcome them.

The design of the game

Our aim was to create a simple game so that players could understand it easily. The mechanics and rules should be transparent so that participants feel free to correct, improve and appropriate them.

Many games are built on actions and objectives to be accomplished, which leaves less room for playful behaviors and experiences motivated by curiosity and exploration [47]. We have tried to move away from this type of play by drawing on the Self Design modelling approach [48]. Dolinska [49] uses the self-design approach to support farmers' exploratory innovation. These role-playing games are designed to allow maximum freedom for the participants, with no predefined rules or objectives. Players can thus conduct a reflexive approach to their practices and objectives, make the game their own and add the elements and rules they deem necessary. However, games that fit this second design can be difficult to play and to facilitate. We therefore sought a balance between these two extremes.

In the end, although the game was less "simple" than we had hoped, the players had no trouble understanding its rules, which they found very close to their reality. More than the design, it is perhaps the acceptance of the game by the players as a model of their socio-ecosystem, and the resulting immersion, that encourages the emergence of surprises.

The facilitator's posture

The facilitator of a workshop must guarantee fairness between the players and the smooth running of the game. However, the facilitator's posture towards surprises is complex and requires a balance between openness and adaptation to the unexpected, time management and respect for the rules. In a co-design process, it is sometimes necessary to modify the rules during the game. Depending on the level of modification required, this can range from simple recalibration to a change in the mechanics of the rule system, which makes adaptation difficult or impossible.

Co-design and freedom of speech

The appearance of surprises depends on the design of the game and the facilitator's posture, but also on the participants' freedom of expression. This freedom of expression can be biased by 1) social inequalities between farmers and breeders with regard to local leaders and Western researchers, and 2) the interest of the inhabitants of rural communities in receiving international aid and therefore in being conciliatory with the initial objectives of the project. Creating a playful atmosphere and a climate of trust can then help to free up speech, to a certain extent.

5.3 Surprises revealing a social transition

While the first two types of surprise must be considered to enable the game to be co-designed and improved, the third type of surprise (improvisation) is more related to the socio-economic context and its transition. It reveals the importance of the diversification of activities in addition to the sole agricultural income and the dynamics of the population decline of rural communities.

A phenomenon of fragmentation of agricultural land has been at work since the agrarian reform of 1953 [40]. This leads to very small farms that are no longer sufficient to support a whole family. As the possibility of buying land remains very limited, rural Andean populations face a shortage of agricultural land [41]. In response, households are diversifying their sources of income.

Migration can be temporary or permanent. Many people are multi-active and have several residences, between town and country. Often, the money earned through mobility is not

reinvested in the countryside, but rather in the education of young people or in land in the city. *'Leaving the village is the ideal sought by the majority of the people who are experiencing upward mobility'* [42]. These migrations mainly concern young people, who leave to study and find job opportunities [43,44]. This change in lifestyle results in migrants often not returning to the communities, switching from temporary to permanent migrants [44]. Rural communities are thus experiencing a slow but certain decline.

However, it is essential to keep land in the countryside as security. Sometimes the family remaining in the community fulfils community duties and looks after the migrants' land and livestock. Zoomers [42] summarizes this contradiction very well: *'It is striking that the majority stress that they hope their children will be able to build a life outside the community, but also emphasize the importance of maintaining contact with the community'*.

The discussions that these surprises gave rise to during the debriefing and the criticism of such behavior revealed the attachment to the community and the desire to live there together.

5.4 Dairy farming project and risk of diversion of the results of the approach?

In Realenga, several people (often agricultural engineers) have a well-defined vision of the development direction that the community should take. One of them is a very active leader, currently head of the irrigators' association and organizer of our game sessions. His project is to build a village at the crossroads of the main roads, 500m from the current village center. The plan of the future village is already drawn and posted in the meeting room. It was approved at a community meeting. The aim is to make it a commercial and active village where mainly local products would be sold. This would counteract the depopulation of Realenga and create local employment. The project is ambitious. The village would have, among other things, a specialized university center and a milk processing plant. The actors, or rather the participants in the workshops, share a vision of the community as a center for milk production. Dairy farming seems to them to be more profitable and less risky than other agricultural and livestock activities.

There is thus a real risk that the game will be used to share and promote their vision of development, to facilitate communication of their project and to encourage participants to invest in dairy livestock.

According to Funder [45], the diversion of a participatory approach by stakeholders is a common occurrence. This reveals an appropriation of the approach by the beneficiaries. Giving participants in a modelling approach control over the use of the model is a central issue in order to achieve a level of participatory modelling that is said to be transformative, i.e. that aims at empowering participants [18,46].

However, there is a fine line between appropriation, diversion and manipulation. It will therefore be necessary to take a closer look at this project, to better identify its supporters and opponents and to understand who would be the losers and the winners.

6 Conclusion

We proposed a methodology for the co-design of role-playing games based on the analysis of surprises, which refers to the concept of serendipity. Our objective was to understand to what extent the analysis of surprises in a role-playing game workshop reveals key mechanisms of the studied system, sometimes difficult to see by researcher-designers. While the first two types of surprises must be considered in order to co-design the game and improve it, the improvisation-type surprises revealed 1) the importance of diversification of activities in relation to the sole agricultural income and 2) the dynamics of depopulation of rural communities. Faced with these surprises, the modification of the rules after discussion and negotiation with and between the players is necessary for a real co-construction of the game. The appearance of surprises is favored by 1) the design of the game 2) the facilitator's posture and 3) a climate of trust.

While being open to surprises is an opportunity to reorient the research project according to what seems important to the participants, the diversion and manipulation of the participatory

process raises ethical questions. In a context of great poverty where environmental conditions can seem hopeless, should we refuse to engage in a process in support of leaders who perceive this tool as an opportunity to communicate their development project and to slow down the exodus of young people? Or should we maintain a purely scientific approach to territorial diagnosis? A Critical Companion type posture [50] may be necessary.

This study raised the need for a game to think about the future of the territory and to consider the issues of rural exodus, in order to go beyond the future proposed by some and make it a vision shared by the whole community. The co-design method will therefore continue by mobilizing the game in order to use it to think about the future of the commons in the indigenous Andean peasant community. Indeed, the commons seemed to appear in watermark during our previous sessions and we wish to question them more to help local actors think about the future of their territory.

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