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Co-designing a serious game for collaborative sanitation planning for resource recovery

Development of specifications and lessons learned from the resulting game

CONCLUSIONS

Our co-design groups expressed enthusiasm for serious gaming as an innovative way for stimulating stakeholder participation. Yet, we found that it was not possible to include all the desired specifications in the final game (see Table), since it would become too complex. E.g. linkages to technical performance was removed in order to simplify rules and to focus on the main message of valuing resources and building cooperation. However, since many stakeholders value simulations to illustrate the choices made in the game, a digital add-on to the board game was developed for the possibility to simulate the performance of system.

Serious gaming in sanitation planning has the potential to stimulate new ideas and open collaboration channels between stakeholders involved in gameplay. However, serious games cannot be stand-alone solutions, but should be embedded within dedicated planning processes and supported by other planning tools.

METHODS

1. Defining needs and specifications

A framework with elements for game design was derived from a literature review of serious games in urban and environmental planning. Specifications were made based on stakeholder interviews.

2. Co-design process with stakeholders

- Scoping workshops to determine content
- Engaging a professional game designers
- Playtesting several versions in workshops

Co-design process for game development: Workshop participants in Uganda (upper left) and Sweden (lower right), as well as game components.

RESULTS

The resulting game was designed to share knowledge about resource recovery and support attitude-change and collaboration between players. It has been used in both Swedish and Ugandan contexts.

Players found it:

- Engaging and stimulated creativity
- Allowed for critical thinking
- Visualized and helped understanding of resource recovery loops
- Highlighted the importance of collaborative sanitation planning

Click here for a video of how the game works (11 min)

Abridged version of specifications for game design of a sustainable sanitation game.
Green = fulfilled; Yellow = partially fulfilled; Red = not fulfilled; * = in digital add-on.

Game design	
Application	Shares knowledge about resource recovery from sanitation and supports attitude-change and collaboration between players
	Influences two sets of stakeholders: a) those playing the game and b) indirectly other stakeholders making decisions on sanitation
World view	Main message is that resource recovery in sanitation is good and that stakeholders need to work collaboratively to achieve it.
	Circular economy is beneficial
	The focus is on NPK recovery, but also includes water and energy
	Equity of benefits & costs between stakeholders is promoted
Content	Two different sanitation contexts are covered: Sweden and Uganda
	Contains the service chain of technologies, where multiple technologies exist at each level of the chain
	Illustrates the implications of different choices, e.g. possibilities to recover resources, achieve environmental & health benefits
	* Simulates the performance of the sanitation system to illustrate the implications of system choices made in the game
	Contains possibilities to design and optimize the service chain at different spatial scales, e.g. centralized or decentralized.
	Multiple stakeholders along the service chain with their different perceptions regarding, e.g. health, environment, and costs.
	Takes into account organizational, cultural and political aspects.
Context of use	A wide set of stakeholders can play the game, both formal and informal actors.
	Conditions affecting the stakeholders and their possibilities for action should be taken into account, e.g. available resources, level of stakeholder engagement, cultural/political aspects.
Genre	A strategy game or developing scenarios and coalitions
	A role-playing game
	* Contains elements of simulation (e.g. of nutrient flows, money, etc.)
Realism	Includes a degree of realism, based on recognizable examples of urban environments.
Narrative	A simple but realistic storyline with clear goals, and provides enough information so that players can relate to their own situation
	Narrative can be reshaped to fit local situations for relevance
Knowledge management & transfer	* Data is managed by the game, such as the performance of different sanitation solutions/systems in the two main situations
	Data used in the game can be adapted to fit a specific context.
	* Exploration & communication of data is done by simulation
	Collects data from the players, such as opinions, choices made, narratives, scenarios and sanitation systems/solutions
Knowledge representation & visualization	Includes representation of key features to make the players recognize, trust and accept the game components as relevant
	Analogue and digital symbolic blocks illustrates the system
	Contains a local perspective (e.g. local map or key features)
	* Visualizes pros and cons of the sanitation system resulting from the play, makes it possible to draw conclusions from the results
Interactivity	Facilitates communication with other players through dialogue
	Communication with the game use analogue and digital means
Game use	
Characteristics of Gameplay	Enjoyment - in a fun and entertaining way learn about sanitation
	Motivates players to improve -to overcome challenges & get rewards
	Inspiration to develop a common vision and make it happen
	Highlights possiblities for friction and conflicting/competing agendas
	Safety - breaking down barriers in a relaxed atmosphere
	Community-building to create coalitions for action
Learning & collaboration	Entice learning by being challenging, entertaining, engaging & realistic
	Stimulate curiosity & opportunities for experimental learning
	Provide a platform for exchange of ideas and opportunity to apply what is being learnt in a subsequent round of the game
	To increase the understanding of system complexity and encourage cooperation and collaboration.
	To create understanding and respect for other stakeholders' perspectives by supporting interaction between different roles
	To encourage inclusiveness, cooperation and collaboration among players to attain a transition towards sustainable sanitation
Assessment of outcomes	* Based on level of resource recovery achieved in the developed system
	Based on level of collaboration and joint learning experienced by the players
	Based on level of innovation in the developed sanitation system
Adaptation	It is possible to adapt the game to match the local situation (e.g. adding relevant content, changing roles, locations, etc.)
Links to planning context	Provides examples of feasible system solutions in support of resource recovery and circular economy
	The game should allow players can relate to their own context, e.g. through development of a practical solution.
	The game is designed to feed data and learnings directly into ongoing planning processes, e.g. dedicated links to the real world.
Game users	
Audience	Includes the collective of all those needed to be involved in a transition towards sustainable sanitation
	Targeting two main groups: those playing the game itself and those interlinked through wider planning and action context
Player interaction	Multiplayer, number of players: 3-7
	Facilitator in place, deals with issues arising from player interaction
	Player roles are defined as key stakeholders involved in sanitation
Dedication	Accessible to inexperienced gamers and no-experts in sanitation planning.
	Requires maximum 2 hour sessions (preferably shorter) & possible to play in multiple shorter session (maximum 1 hour)