Design Pattern for Exploration and Experimentation: Result of Field Study on a *Toy-Based* Serious Game Design Method

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Experimenting methods for Toy-Based SG Design

Toy-Based SG Design could provide exploration and experimentation-based learning. Ryan et al. provide an untested design method based on Shell's "*Lens of the Toy*". The 5 steps method is compared to our 6 facets of SG Design (Table).

Our study experiments the method, in order to **extract new design patterns**. It is a **four years** design-driven collaborative research study **with 100+ designers**.

The **results** are:

- An **evaluation of Ryan et al. design method**
- A **new tested design pattern**
- Some tested **methodological insights**.

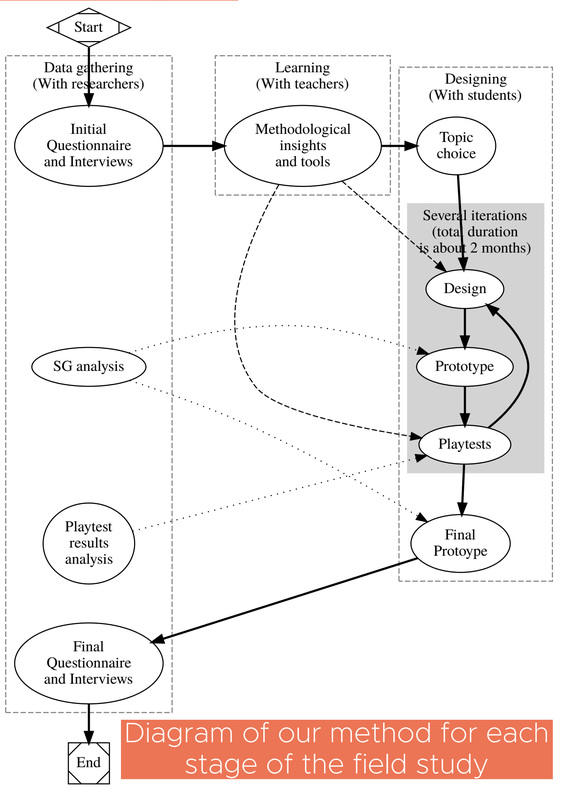
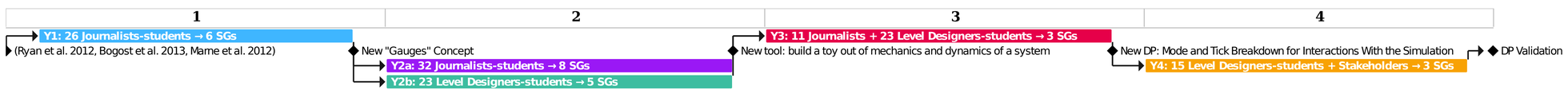


Diagram of our method for each stage of the field study

Comparison of the 5 steps of Ryan et al. and the 6 facets of Marne et al.

5 steps from Ryan et al.	6 facets from Marne et al.	Toy
"1. Identify a fine-grained model of the mechanics and dynamics of the real-world system."	"Facet 1: Pedagogical objectives" modelling taught topics, usually with a curriculum, a graph, or an ontology.	Design
"2. Present the system to facilitate the recognition of patterns."	"Facet 2: Domain simulation": describing and modelling systems at work. For instance, with an expert rule-based system or equations.	
"3. Provide a tool for embodied, playful control."	"Facet 3: Interactions with the Simulation": designing a playful interface to the simulation (described in facet 2) by implementing "basic actions" for players.	
"4. Add goals to stage the player's exposure to the system."	"Facet 4: Problems and Progression": designing the challenges given to the players and the progression flow toward them.	Use
"5. Provide support for social sharing of expertise."	"Facet 6: Conditions of Use": Choose the playing conditions (solo/multi? Online? With or without a teacher/trainer? How much time? Which public? etc.)	
	"Facet 5: Decorum": designing the gamification to enhance extrinsic motivation (e.g. sound design, graphic design, narration, specific game mechanics not related to the simulation, etc.)	Unrelated

Gantt diagram of the four years/stages



25 SGs produced: the analysis

The 4 stages (years) of the field study

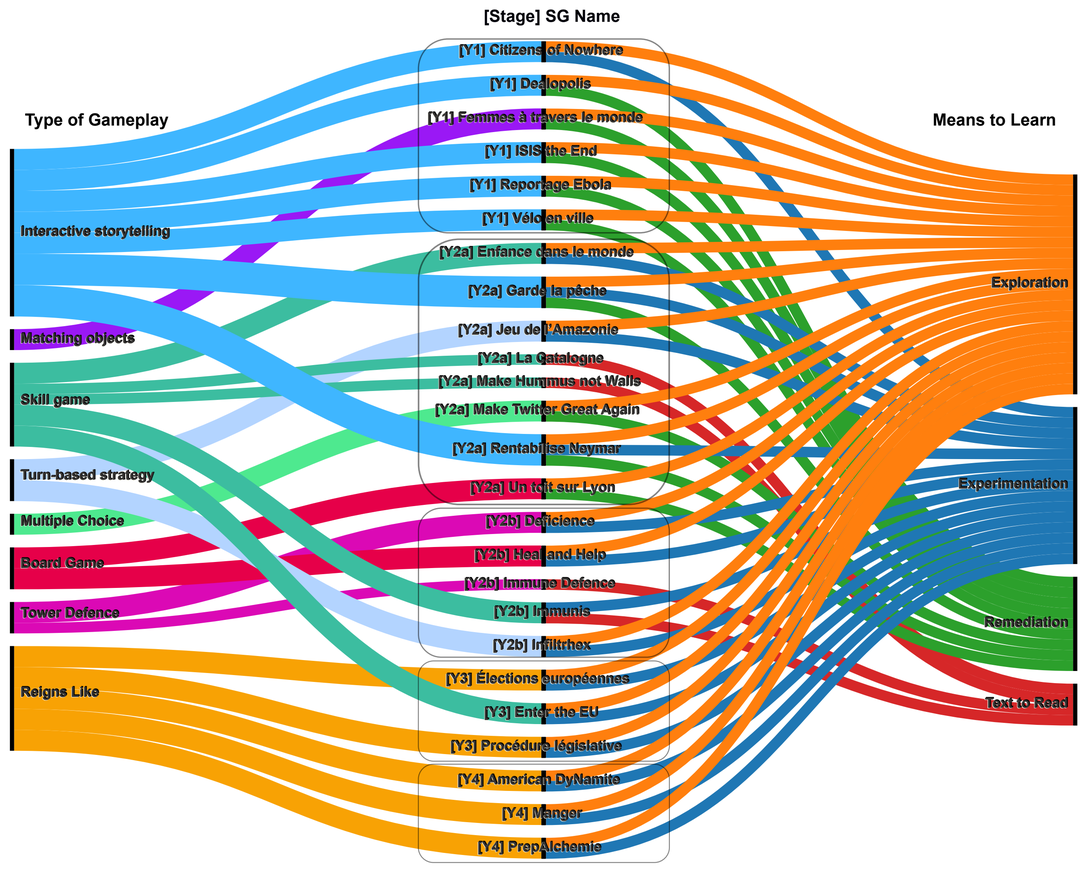
Stage	Designers involved	SGs made	Methodological tools provided	Development tools provided	SGs topics
Y1	26 journalism students	6	Introduction to SGs + 6 facets + toy-based SGs as a good practice.	Interactive storytelling: Twinery, Klynt. Role-playing games: RPG Maker. Point and click: eAdventure. Visual programming: Construct, Gdevelop.	Free
Y2a	32 journalism students	8	Same as Y1 + concept of gauges as a reification of systemic values.	Step 1: papers and scissors (board game). Step 2: same as Y1, but priority on visual programming tools.	Free, but systemic
Y2b	23 level design students	5	Work on the "Lens of the toy" + 6 facets.	Construct, Gdevelop.	Immune system
Y3	23 level design students + 11 journalism students	3	A detailed methodology based on the 6 facets and the 5 steps .	Construct, Gdevelop Unity 3D.	Imposed topics
Y4	15 level design students + real stakeholders	3	Full DP + additional methodological tools	Same as Y3	Same as Y3

Different types of gameplay and how the learning is induced

In all 25 SGs produced in this study, there are only four means to induce learning, and often in combination:

1) **Exploration**, to discover new knowledge and build hypotheses;
2) **Experimentation**, to test hypotheses and transfer competencies;
3) **Remediation**, to have means to understand why an error was made and learn from it;
4) **Text to read**, to learn while reading some information or courses.

Ryan et al. toy-based SGs are targeting the combination of the first two.



Alluvial diagram of the SGs designed, the gameplay type and the means to learn

A new Design Pattern based on the game *Reigns*



Screenshot of Reigns, showing a situation, gauges (top), and a swipe left/right choice.

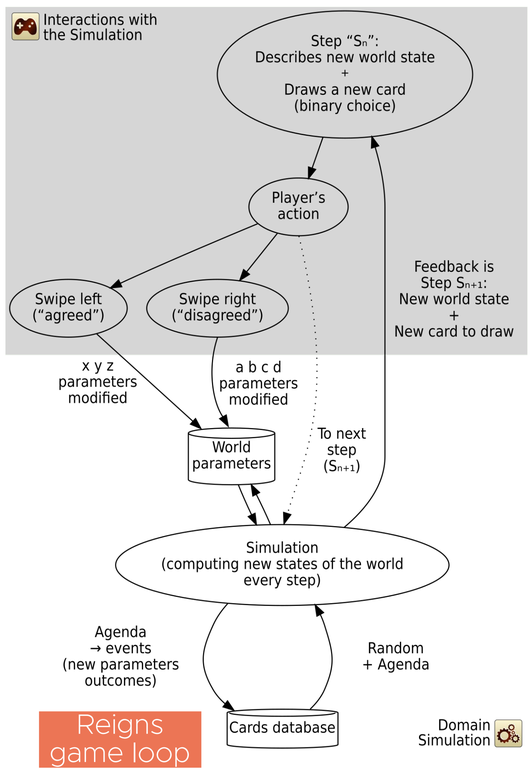


Screenshot of an Y3 SG, showing a situation, gauges (top-left), and a binary choice.

Mode and Tick Breakdown for Interactions With the Simulation (design pattern excerpt)

Problem

How to design a toy or a microworld that is a proper interface to the simulation, in order to allow serious players to explore and experiment, while learning and having fun?



Reigns game loop

Solution

Inspired by the *Reigns* videogame, you can easily create an interface with the parameters of the simulation that is both simple to design and fun for serious players.

Reigns is a management game, where you assume the role of a king. The game has four gauges driven by a simulation (the church, the people, the military, and wealth).

To modify the game parameters (metric bars), *Reigns* authors choose an interface inspired by online dating app such as *Tinder*: in each round, a new description of the world is given on a card. It comes with a binary question. The player can only agree with a swipe left, or disagree with a swipe right.

Rounds of the game are called steps. At the top, there is the means given to the player to act and thus modify the simulation parameters: simulated world overview, possible actions, feedback. The bottom shows how the simulation computes the world as a result of the players action. a, b, c, d, x, y, z are examples of parameters modified by the players action. At each step, the simulation computes the world state: it computes all the parameters, but also the possible future events, depending on the game agenda. At each step, such events can be related to the parameters or either random. The next step is some feedback on the results of the action, a description of the new event and a new question is asked. You may use this kind of interaction in your serious game. Meaning proposing to the serious player, at each step, a new description/question along with a set of binary actions (agree/disagree). But you can also adjust both main attributes:

- Tick Breakdown: duration of the step. Playing *Reigns*, at each step the player can take time to decide whether he/she agree or disagree to the question. Instead, you can provide a different step breakdown: instead of a turn-based step, you can use a time-based step. And then, you can decide the duration of the step (tick of the serious game). At one end, there is a turn-based step such as *Reigns*. At the other end, the steps are run as fast as possible (real time tick) such as *Ancestors: The Humankind Odyssey*. You may place the cursor wherever it suits you.

Turn based — Real time

- Mode: types of actions allowed to serious players. Playing *Reigns*, the player can only agree or disagree with the question. Instead, you can provide many more kinds of actions. For instance, you can allow more kinds of answers. Of course, you can also propose more types of actions than answering questions. During design, it makes sense to gradually increase the number of available types of actions (modes): at one end, you have *Reigns* with the smallest possible modes of action (binary). At the other end, you have a huge variety of possible actions (multimodality) such in *Crusader Kings*. You may place the cursor wherever it suits you.

Binary — Multimodality

References

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