Data Article

Interaction analysis data of simulation gaming events using the serious game Aqua Republica

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ABSTRACT

The data presented in this article is related to the research article entitled ‘Serious games as a catalyst for boundary crossing, collaboration and knowledge co-creation in a watershed governance context’ (Jean et al., In press) [1]. Understanding the team dynamics related to serious game simulations is critical for understanding the potential uses and functions of these simulations for knowledge co-creation (Medema et al., 2016) [2]. The data was obtained from four independent serious game simulation events and consists of n = 40 participants. Participants were divided into small teams and were then recorded playing the serious game Aqua Republica (http://aquarepublica.com/). Interactions were tallied and interaction maps created using the visualization software GEPHI (https://gephi.org/). The interaction maps allow for a visual representation of the progression of interactions over the course of four subsequent phases of gameplay (Jordan and Henderson, 1995) [3].

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### Specifications Table

| Subject area                        | Water resource management, social sciences, learning sciences |
|------------------------------------|---------------------------------------------------------------|
| More specific subject area         | Serious game simulations                                       |
| Type of data                       | Table, figures                                                |
| How data was acquired              | Audiovisual recordings then transformed using GEPHI visualization software |
| Data format                        | Raw, analyzed and descriptive data                            |
| Experimental factors               | • Sample consisted of a variety of stakeholders working in the field of watershed management |
|                                   | • Teams were recorded playing the serious game Aqua Republica |
|                                   | • Number of interactions of players in each team were tallied |
| Experimental features              | Tallied interactions were used to create interaction maps      |
| Data source location               | Montreal, Canada; Ottawa, Canada; Moncton, Canada; Halifax, Canada. |
| Data accessibility                 | Data is included in this article                              |
| Related research article           | Jean S, Medema W, Adamowski J, Chew C, Delaney P, and Wals A. Serious games as a catalyst for boundary crossing, collaboration and knowledge co-creation in a watershed governance context. (in press) |

### Value of the data

- Data presented in this Data in Brief transform interactions between participants into interaction maps that allow for a quick visual understanding of interaction dynamics.
- A visual understanding of the interaction data allows for trends to be spotted that may not be obvious using only numerical data.
- Data and methods included can be used for a variety of different fields and are not limited to serious game simulations or a watershed governance context.
- All studies on team and group dynamics can find value in this data and the methods used to visualize team interactions (Figs. 1–3).

### 1. Data

Audiovisual recordings were used in order to obtain the raw data. Interactions between players were tallied and classified as either (a) directed interactions (between two individuals) or (b) team interactions (broader statements shared with the team) [3–5]. Team interactions were documented over four phases of gameplay for each game simulation event, for each team (11 teams total). Each of the four phases of gameplay consists of a ten-minute period and is separated from the next phase by another ten-minute period. These four phases are selected over the course of each game simulation event as follows: phase 1 (0–10 min); phase 2 (20–30 min); phase 3 (40–50 min); and phase 4 (60–70 minutes). By dividing the game simulation events into these smaller phases; interactions can be tallied and displayed graphically to provide a visual overview of how team interactions evolve over time [6]. The legend for all the figures included in this Data in Brief is provided in Fig. 4 in the research article entitled ‘Serious games as a catalyst for boundary crossing, collaboration and knowledge co-creation in a watershed governance context’ [1]. Each of the following Tables and Figures (interaction maps) corresponds to one of
the eleven teams. Some of the interaction maps for certain teams and specific phases of the game simulation events have been left out of this Data in Brief (i.e. Moncton Team 2 Phases 1 and 3, Ottawa Team 2 Phases 1 and 2, Ottawa Team 3 Phases 1 and 2, and McGill Team 2 Phases 1 and 3) while they have already been provided in the above mentioned research article [1].

Table 1
Interaction data Moncton Team 1.

| Moncton Team #1          | Phase 1 | Phase 2 | Phase 3 | Phase 4 |
|--------------------------|---------|---------|---------|---------|
|                          | Team    | Team    | Team    | Team    |
|                          | P1      | P2      | P3      | P1      |
| P1                       | X       | 7       | 5       | X       |
| P2                       | 4       | X       | 3       | 2       |
| P3                       | 5       | 7       | X       | 5       |
|                          | P1      | P2      | P3      | P1      |
| Phase 1                  | 15      | 21      | 10      | 17      |
| Phase 2                  | 20      | 24      | 26      | 24      |
| Phase 3                  | 20      | 24      | 18      |         |
| Phase 4                  | 20      | 24      | 18      |         |

Fig. 1. Interaction maps Moncton Team 1 Phase 1–4.
### Table 2
Interaction data Moncton Team 2.

|                | Phase 1 |                | Phase 2 |                |
|----------------|---------|----------------|---------|----------------|
|                | P1      | P2  | P3  | Team | P1  | P2  | P3  | Team |
| P1             | X       | 9   | 5   | 21   | P1  | X   | 6   | 3   | 21   |
| P2             | 14      | X   | 1   | 8    | P2  | 7   | X   | 0   | 17   |
| P3             | 8       | 0   | X   | 5    | P3  | 2   | 0   | X   | 13   |

|                | Phase 3 |                | Phase 4 |                |
|----------------|---------|----------------|---------|----------------|
|                | P1      | P2  | P3  | Team | P1  | P2  | P3  | Team |
| P1             | X       | 4   | 3   | 26   | P1  | X   | 7   | 5   | 22   |
| P2             | 4       | X   | 1   | 12   | P2  | 15  | X   | 1   | 20   |
| P3             | 2       | 1   | X   | 11   | P3  | 5   | 1   | X   | 7    |

**Fig. 2.** Interaction maps Moncton Team 2 Phase 2 and 4.

### Table 3
Interaction data Halifax Team 1.

|                | Phase 1 |                | Phase 2 |                |
|----------------|---------|----------------|---------|----------------|
|                | P1      | P2  | P3  | Team | P1  | P2  | P3  | Team |
| P1             | X       | 4   | 2   | 17   | P1  | X   | 0   | 4   | 16   |
| P2             | 6       | X   | 2   | 5    | P2  | 0   | X   | 0   | 8    |
| P3             | 5       | 1   | X   | 3    | P3  | 3   | 0   | X   | 13   |

|                | Phase 3 |                | Phase 4 |                |
|----------------|---------|----------------|---------|----------------|
|                | P1      | P2  | P3  | Team | P1  | P2  | P3  | Team |
| P1             | X       | 3   | 4   | 26   | P1  | X   | 1   | 4   | 14   |
| P2             | 3       | X   | 2   | 18   | P2  | 3   | X   | 2   | 6    |
| P3             | 4       | 2   | X   | 20   | P3  | 4   | 3   | X   | 7    |
Table 4
Interaction data Halifax Team 2.

| Halifax Team #2 | Phase 1 | Phase 2 | Phase 3 | Phase 4 |
|-----------------|---------|---------|---------|---------|
| P1 X 3 2 2 15   | P1 X 3 2 3 26 |
| P2 4 X 0 0 8    | P2 3 X 1 1 17 |
| P3 4 0 X 0 9    | P3 3 1 X 1 17 |
| P4 4 2 0 X 7    | P4 3 0 0 X 11 |
| P1 X 3 4 3 23   | P1 X 2 2 3 14 |
| P2 3 X 0 0 15   | P2 3 X 2 2 6  |
| P3 4 0 X 0 21   | P3 3 2 X 3 9  |
| P4 3 0 0 X 18   | P4 3 1 3 X 5  |
**Fig. 4.** Interaction maps Halifax Team 2 Phases 1–4.

**Table 5**
Interaction data Ottawa Team 1.

| Ottawa Team #1 |                  |                  |
|----------------|------------------|------------------|
|                | Phase 1          | Phase 2          |
|                | P1   P2   P3   Team | P1   P2   P3   Team |
| P1             | X 9 0 9 Team | P1   X 9 3 13   |
| P2             | 10 X 6 8 Team | P2   8 X 8 14   |
| P3             | 0 6 X 5 Team   | P3   2 5 X 12   |

|                | Phase 3          | Phase 4          |
|                | P1   P2   P3   Team | P1   P2   P3   Team |
| P1             | X 4 1 12 Team   | P1   X 4 4 13   |
| P2             | 4 X 6 15 Team   | P2   7 X 4 17   |
| P3             | 1 4 X 14 Team   | P3   4 5 X 13   |
Fig. 5. Interaction maps Ottawa Team 1 Phases 1–4.

Table 6
Interaction data Ottawa Team 2.

| Ottawa Team #2 |            |            |            |            |            |            |            |            |            |            |            |
|----------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
|                |            |            |            |            |            | P1         | P2         | P3         | P4         | Team       |
| Phase 1        |            |            |            |            |            |            |            |            |            |            |            |
| P1             | X          | 5          | 2          | 0          | 12         | P1         | X          | 1          | 2          | 0          | 10         |
| P2             | 5          | X          | 3          | 0          | 10         | P2         | 1          | X          | 6          | 0          | 19         |
| P3             | 1          | 3          | X          | 6          | 18         | P3         | 1          | X          | 6          | 0          | 20         |
| P4             | 0          | 0          | 6          | X          | 9          | P4         | 0          | 1          | 3          | X          | 14         |
| Phase 2        |            |            |            |            |            |            |            |            |            |            |            |
| P1             | X          | 5          | 2          | 0          | 9          | P1         | X          | 2          | 0          | 0          | 9          |
| P2             | 3          | X          | 2          | 0          | 18         | P2         | 3          | X          | 3          | 1          | 16         |
| P3             | 0          | 4          | X          | 6          | 21         | P3         | 0          | 3          | X          | 7          | 19         |
| P4             | 0          | 1          | 6          | X          | 16         | P4         | 0          | 1          | 5          | X          | 17         |

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**Table 7**

Interaction data Ottawa Team 3.

| Ottawa Team #3 |
|----------------|
| **Phase 1**    | **Phase 2**    |
| P1  | P2  | P3  | Team | P1  | P2  | P3  | Team |
| X   | 6   | 0   | 13   | X   | 1   | 2   | 22   |
| X   | 3   | 15  | P2   | X   | 2   | 6   | 16   |
| X   | 3   | 5   | X    | 8   | 4   | 5   | X    |

| **Phase 3**    | **Phase 4**    |
| P1  | P2  | P3  | Team | P1  | P2  | P3  | Team |
| X   | 2   | 17  | P1   | X   | 5   | 3   | 19   |
| X   | 5   | 17  | P2   | X   | 3   | 4   | 20   |
| X   | 5   | 14  | P3   | 3   | 4   | X   | 18   |

**Fig. 6.** Interaction maps Ottawa Team 2 Phase 3 and 4.

**Fig. 7.** Interaction maps Ottawa Team 3 Phase 3 and 4.
Table 8
Interaction data McGill Team 1.

| Phase 1 | Phase 2 |
|---------|---------|
| P1 | P2 | P3 | P4 | P5 | Team | P1 | P2 | P3 | P4 | P5 | Team |
| P1 | X | 1 | 2 | 1 | 1 | 3 | P1 | X | 1 | 0 | 0 | 0 | 1 |
| P2 | 1 | X | 1 | 2 | 0 | 8 | P2 | 1 | X | 3 | 1 | 1 | 17 |
| P3 | 1 | 1 | X | 5 | 4 | 14 | P3 | 0 | 2 | X | 4 | 1 | 16 |
| P4 | 0 | 2 | 4 | X | 2 | 12 | P4 | 0 | 2 | 4 | X | 0 | 15 |
| P5 | 1 | 1 | 5 | 2 | X | 12 | P5 | 0 | 1 | 2 | 0 | X | 12 |

| Phase 3 | Phase 4 |
|---------|---------|
| P1 | P2 | P3 | P4 | P5 | Team | P1 | P2 | P3 | P4 | P5 | Team |
| P1 | X | 1 | 0 | 0 | 0 | 4 | P1 | X | 0 | 0 | 0 | 0 | 3 |
| P2 | 1 | X | 3 | 0 | 2 | 19 | P2 | 0 | X | 1 | 2 | 2 | 14 |
| P3 | 0 | 3 | X | 1 | 0 | 16 | P3 | 0 | 0 | X | 1 | 1 | 22 |
| P4 | 0 | 0 | 1 | X | 0 | 16 | P4 | 0 | 2 | 1 | X | 0 | 20 |
| P5 | 0 | 2 | 0 | 0 | X | 14 | P5 | 1 | 0 | 1 | 0 | X | 19 |

Fig. 8. Interaction maps McGill Team 1 Phases 1–4.
Table 9
Interaction data McGill Team 2.

| Phase 1 | Phase 2 |
|---------|---------|
| P1  | P2  | P3  | P4  | Team | P1  | P2  | P3  | P4  | Team |
| X   | 6   | 3   | 2   | 14   | X   | 2   | 3   | 1   | 27   |
| 4   | X   | 8   | 4   | 13   | P2  | 2   | X   | 5   | 1    |
| 3   | 10  | X   | 3   | 10   | P3  | 3   | 5   | X   | 4    |
| 2   | 4   | X   | 15  | P4   | 1   | 0   | 3   | X   | 19   |

Phase 3

| Phase 4 |
|---------|
| P1  | P2  | P3  | P4  | Team | P1  | P2  | P3  | P4  | Team |
| X   | 10  | 7   | 4   | 16   | X   | 0   | 5   | 4   | 33   |
| 7   | X   | 6   | 4   | 17   | P2  | 0   | X   | 3   | 2    |
| 6   | 7   | X   | 3   | 17   | P3  | 4   | 4   | X   | 5    |
| 3   | 2   | 3   | X   | 16   | P4  | 2   | 1   | 3   | X    |

Fig. 9. Interaction maps McGill Team 2 Phase 2 and 4.

Table 10
Interaction data McGill Team 3.

| Phase 1 | Phase 2 |
|---------|---------|
| P1  | P2  | P3  | Team | P1  | P2  | P3  | Team |
| X   | 6   | 2   | 7    | X   | 2   | 1   | 13   |
| 6   | X   | 9   | 14   | P2  | 2   | X   | 7    |
| 2   | 10  | X   | 13   | P3  | 1   | 7   | X    |

Phase 3

| Phase 4 |
|---------|
| P1  | P2  | P3  | Team | P1  | P2  | P3  | Team |
| X   | 2   | 2   | 10   | P1  | X   | 5   | 2    |
| 2   | X   | 8   | 23   | P2  | 2   | X   | 11   |
| 2   | 7   | X   | 22   | P3  | 2   | 13  | X    |
Fig. 10. Interaction maps McGill Team 3 Phases 1–4.

Table 11
Interaction data McGill Team 4.

| McGill Team #4 |
|---------------|
| Phase 1       | Phase 2      |
|               |              |
| P1  P2  P3  P4  P5  Team | P1  P2  P3  P4  P5  Team |
| P1  X  1  0  0  0  0 | 15           | P1  X  1  0  1  0 |
| P2  2  X  0  1  1  22  | P2  1  X  0  0  0  34 |
| P3  0  0  X  0  4  4  | P3  0  X  0  0  0  0  |
| P4  0  1  0  X  2  18  | P4  0  0  0  X  1  23  |
| P5  1  1  0  0  X  22  | P5  0  0  0  1  X  29  |

| Phase 3       | Phase 4      |
|---------------|--------------|
|               |              |
| P1  X  0  0  0  0  0 | 24           | P1  X  2  0  0  0  0  6  |
| P2  0  X  0  0  0  35  | P2  2  X  0  0  0  16  |
| P3  0  0  X  0  0  0  | P3  0  X  0  0  0  0  |
| P4  0  0  0  X  0  29  | P4  0  0  0  X  4  14  |
| P5  1  0  0  0  X  23  | P5  1  0  0  4  X  15  |
2. Experimental design, materials, and methods

2.1. Study area and participants

As part of this data [1], four game simulation events were organized in Quebec, Ontario and the Maritimes. In Quebec, an event was organized with students from the Integrated Water Resource Management (IWRM) master’s program at McGill University in Montreal as part of one of their required courses, this particular event was divided into two sessions with two cohorts of students. Two events took place in the Maritimes in association with two local watershed organizations acting as intermediaries for diverse stakeholder teams in their watershed territories, the Petitcodiac Watershed Alliance (PWA) in Moncton and the Sackville River Association (SRA) in Halifax. Both events involved participants from academia, local government, non-profit organizations and conservation authorities. The fourth event was organized in Ontario with the Rideau Valley Conservation Authority (RVCA) in Ottawa, involving employees, stakeholders and members of the board of directors. In total, over the course of the four events, 40 individuals participated in this data. The following table shows a breakdown of the events and the corresponding teams formed from them: (Figs. 5–11, Table 12).
2.2. Materials

For each event laptops were used in order to run the Aqua Republica simulations. Furthermore, camcorders were set up in front of each team in order to obtain audio-visual information for the entire time of gameplay (Tables 1–12).

2.3. Experimental design and methods

Participants for each event were randomly divided into teams and given the chance to play the Aqua Republica serious game. Participants had no say in which team they were a part of. Participants were recorded while playing the game. The recordings were then analyzed and interactions from all participants were tallied and then transformed into interaction maps divided into four 10-min phases (see data section for information on how phases were divided).

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Transparency document. Supporting information

Transparency data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.dib.2018.06.031.

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