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project & proces

The use of an Interactive Virtual Communication Platform in the EMOVE-project

Description of the building process and evaluation of its use

March 2015

The Interreg IVB North Sea Region Programme
investing in the future by working together for a sustainable and competitive region

EMOVE

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1. Introduction

In the Interreg North Sea IVB project EMOVE partners from Belgium, the Netherlands, Germany and Sweden work together on a joint vision on the sustainable management of estuaries.

In the international cooperation and in the cooperation with stakeholders of the different estuaries new innovative tools are being explored to facilitate the cooperation and communication. During the EMOVE project an Innovative Virtual Communication Platform has been developed and tested.

The innovative virtual communication platform is a way to facilitate stakeholder engagement and international cooperation in the EMOVE project. The aim (as described in the Application form) is to deliver a working and evaluated platform in an online virtual world as a way to facilitate (trans)national and regional communication and cooperation concerning complex spatial problems, in this case focused on estuaries.

The first target group we are aiming at are policy workers in governmental, societal and commercial organisations. This group consists of professionals that have a basic understanding of estuaries and the issues at stake, and are competent in dealing with geographical, spatial information. The second target group we are aiming at are stakeholders who are involved in the sustainable management of estuaries. In the EMOVE project most of the stakeholders involved were representatives of governmental organisations, private companies and NGO's.

An online website(www.emove-project.eu) and a LinkedIn discussion group have been set up. This report will solely describe and evaluate the design and the use of the IVCP.

2. Building the IVCP

2.1 Introduction

This chapter describes how the IVCP is produced and used in the project EMOVE. At first we will describe the decisions that were at the basis of the development of the IVCP. We describe the process with stakeholders that led to the IVCP. For more thorough process descriptions of the EMOVE-activities we refer to other reports of the project.

2.2 Choices for the design of the IVCP

At the initiation of the project, several options were researched for the design of the IVCP.

1. The first option was to build the IVCP in current online 3D virtual worlds like Second Life and Open Sim. The advantage of this option is that online virtual worlds are suitable for online, 'multiplayer' meetings. But there are some major disadvantages for this option:
    a. Steep learning curve: hard to use, difficult to create life like environments
    b. Difficult to use in office settings with tight safety regulations for the use of computer software
2. The second option was to make use of game software. The main advantage is that the technology is very suitable for creating natural environments. The main disadvantage is that it takes a huge effort to allow people to meet online

The first evaluations with project partners and stakeholders showed us that there was high demand for visualisations of estuaries and other complex processes in estuaries to facilitate the development of shared views between stakeholders. This was the reason that the international project team decided to:

1. Focus of IVCP on making complex issues and systems understood
    a. Visualise basic functioning of all estuaries, based on Joint Fact-Finding
    b. Explore & visualise by playing the estuary-management-game
2. Make 'meet & discuss online' part of project website and the EMOVE Linked-In group.

The IVCP is more focussed on the "Innovative Virtual" aspect than on the "Communication platform'' aspect. Interactive 3D virtual tools have been produced to help stakeholders understand the functioning of estuaries and to exchange thoughts about it with each other. The tools have been used in processes with stakeholders in Germany, Sweden and the Schelde.

The tools can be used on different levels of stakeholder participation. On the lowest level of participation (informing), visualisations can be used to visualise and illustrate problems, processes or new projects. The tools can also be used to facilitate and boost conversations between stakeholders on higher levels of participation. In a serious game stakeholders can put themselves in the position of the administrator, which leads to a larger understanding and a way for joint responsibility.

2.3 The role of the stakeholders in developing the IVCP

The IVCP has been developed in cooperation with the stakeholders in the Schelde-estuary, the Swedish stakeholders and with the partners in the EMOVE-project. Furthermore we exchanged experiences with the CAMINO project.

The following steps have been undertaken:

1. Consultation with the EMOVE partners about the goal and functionality of the IVCP.
2. Use of an interactive 3D visualisation in Sweden (a simple game setting) (see chapter 3.3)
3. Discussion with Schelde-stakeholders about the use and necessity of a virtual communication platform

The stakeholders around the Schelde-estuary are working on a shared vision of the estuary and are looking for shared projects in order to shape this vision. During a workshop on the 30th of September 2014 a demonstration was given, and possibilities for the use of the IVCP were discussed and explored. During this session, two IVCP computer visualisations were demonstrated: the effects of a rising sea level on the banks of the Göta-Älv in southern Sweden and the development of salt marshes in an estuary. There has been a discussion about how these virtual 3D-images could be deployed on the Schelde. There are opportunities

for clarifying complex processes in the estuary (tide, dynamics) and the current management. There are also opportunities for showing future projects in these future-images. The participants do not see any good in connecting these visualization to discussion groups on LinkedIn or other platforms, mainly because these kinds of discussions will often be dominated by an individual with a strong opinion.

1. Based on the results of this workshop, and the experiences with visualisations of the Göta Älv, the decision has been made by the EMOVE project team to produce an estuary management game, in which a player of the game takes on the role of estuary manager.
2. Session with Schelde-stakeholders about the use and specifications of the game. We discussed a first proposal of the design with a group of Schelde-stakeholders. The stakeholders told their expectations for the game. The results of this meeting were used in building the estuary management game.
3. Test session with Schelde-stakeholders with a working version of the game. For the results of this session, see chapter 3.4.2.
4. Exchange with the Interreg NSR IVB project CAMINO Members of the EMOVE-team visited members of the Interreg Northsea IVB project CAMINO to exchange experiences and knowledge. The estuary game was shown and discussed briefly. The CAMINO team saw possibilities for the use of such a tool in stakeholder engagement.
5. Continuation of test sessions at the University of Applied Science. On Feb 25th 2015 the next version of the estuary game was tested with second year students of applied sciences in Vlissingen. The students study Delta Management and Water Management were experienced gamers. The results of this test session are described in chapter 3.4.3.
6. The final conference was held on March 4th 2015 in Antwerpen. During the conference there were two sessions where the attendants were able to play the Estuary Management Game. You can read about these workshops in chapter 3.4.4.

Exchange with project Camino

3. The EMOVE 3D visualisations

3.1 Introduction

This chapter describes the three parts of the Innovative Virtual Communication Platform inside EMOVE.

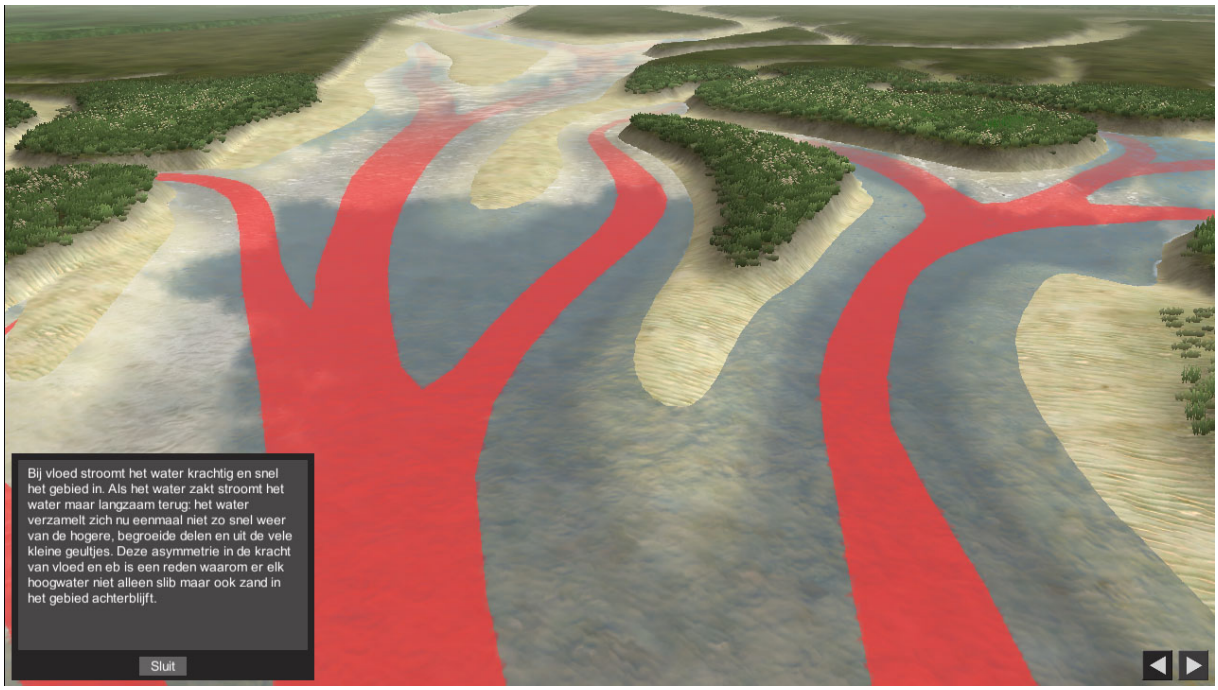
Visualisations with different level of interaction have been made. At first the visualisation of the process of the developments of salt marshes will be discussed. This visualization is basically an animation, a partially interactive video, that is played on the screen. Secondly, we will describe the interactive 3D visualisation of the Göta älv in Sweden and how it has been used in the process with stakeholders. This visualization is more interactive, in a sense that users can change the camera position and choose different water levels to be displayed. Finally the main product of the IVCP, the EMOVE estuary management game, EMOVER, will be described. EMOVER is a full-fletched game, where users can actually make management decisions and see how they work out.

3.2 3D virtual representation of development of salt marshes

During the Joint Fact Finding process of the Schelde estuary the need for the need of a visualisation of elementary physical processes in the estuary became clear. The development of salt marshes has been visualised as an example. A virtual 3D visualisation shows how a tidal flat becomes gown over and how it eventually evolves into a salt marsh. This visualisation can also be used as an educative tool for showing stakeholders the arising of salt marshes. This could be important for creating a shared view on the functioning of the estuary.

3.3 An interactive 3D virtual model of the Nordre Älv Sweden

The river Göta-Älv mouths out at sea both through the Göta älv estuary and the Nordre älv estuary. The rising sea level is expected to cause large areas to face flooding issues in the future. For example in the Göta älv estuary, flooding is expected to cause costly impacts for the central



Animation of growth of tidal marshes

Visualisation of sea level rise, Sweden

parts of Göteborg city. Nordre älv is a non-dredged estuary that also will be impacted by the sea level rise, but also may be affected by large scale solutions to protect the city of Göteborg.

Dialogues with stakeholders have been initiated in order to discuss the potential impacts on Nordre älv of sea level rise and different measures that could be taken. To facilitate these talks a 3D-visualisation has been made of the Nordre Älv in which different water levels can be shown. These visualisations have been used in a stakeholder meeting on September 4th 2014.

3.3.1 Description of the virtual 3D visualisation

The model has been made in game software. Everybody is able to download a visualisation [link on the EMOVE website] to use on their own PC. This visualisation is both realistic and recognizable. The topography used in this model is made using national real elevation data (Lantmäteriet) and estimates by SMHI of sea level rise for year 2100 and statistical frequency of current flood events, i.e. water levels occurring once every 100 years (Persson et al., 2011[1]).

Using the computer mouse a player is able to move through the area and select and observe several different scenarios. The following four scenarios have been made:

- The year 2014 with the average water level
- The year 2014 with a water level occurring once every 100 years
- The year 2100 with the average expected water level
- Current situation and the year 2100 with a water level occurring once every 100 years

Current mean water level (user interface in upper left corner)

1/100 water level in 2100

3.3.2 Stakeholder meeting

The visualisation has been used in a meeting with stakeholders about the effects of rising sea level. The goal of the meeting was to (based on previous interviews and compiled background information) confirm which where the drivers of the estuaries (Nordre älv estuary and Göta älv estuary), identify and suggest solutions, identify the barriers for the suggested solutions, and identify potential solutions of the barriers.

The aim of using the model was to show what will be the impact of sea level rise due to climate change in the Nordre älv estuary as a basis for further discussions on potential solutions. The model was found very useful to visualize, and

thereby as a help for the stakeholders to perceive the impacts of flooding (today and in the future due to climate change) in the Nordre älv estuary. The stakeholders found the model very realistic and they could easily recognize the area.

3.4 EMOVER: a serious estuary management game

During the project a serious game about the management of estuaries has been developed. The aim of the game is to:

- Let stakeholders experience the cohesiveness and complexity of estuaries.
- Increase the knowledge of stakeholders about dominant physical processes.
- Urge stakeholders to try to develop a comprehensive vision on sustainable development of an estuary.
- Give stakeholders insight in the results of their management actions while playing the game .

The player of the game acts as an estuary manager and gets direct feedback on her actions.

The game is explicitly not a decisional model with which scenarios can be calculated. It concerns a fictive estuary and the underlying calculations are relatively simple.

3.4.1 Description of the game

The player of the game can manage a fictive Estuary. The player is able to perform several management activities and gets feedback about the effects of these measures on different aspects of the estuary. This is done via a simple calculation module, in which the response of the estuary to management decisions is calculated. The calculations “under the hood” were developed in collaboration with a specialist of estuary morphology and management of Deltares. They consist of simple, one-dimensional empirical relationships based on extensive research in, mainly, the Schelde estuary.

A player gets the opportunity to play this game on a computer screen and select different measures for the management of the estuary. These different measures are:

- Dredging bars in the shipping lane
- Changing the locations of deposition of dredged materials
- Reclaiming land from (high) salt marshes

EMOVER, simulation of estuary management

- Managed realignment of (low) polders (in combination with reclaiming land this leads to ''shifting reclamation'', one of the ideas from stakeholders in the Schelde-estuary)

After measures have been taken the game will use the new situation and the effects of the measures will be qualitatively scored on the following four criteria with several subcriteria:

- Shipping (shipping lane depth)
- Nature (marsh diversity, marsh extent, tidal flat extent)
- Resistance against flooding (polder height, dike length, high water levels)
- Available farmland (area agricultural land, salt intrusion)

Screendump of the game under construction

The game ends after 200 virtual years of management, which takes 10-20 minutes to complete. The player gets the opportunity to see an overview of management decisions and their effect on the estuary.

In a separate document, available through the EMOVE website, the model for management decisions and effects on the estuary and functions can be found.

3.4.2 Playing the game with Schelde stakeholders

Aim
On the 4th of February 2015 a group of 8 stakeholders involved with the Schelde played a beta-version of the game. The functionality of the game was good, but the user interface had not been developed to a large extent. The feedback about the results of the management actions of the players had also not been filled in yet. The group of stakeholders contained several experts that were able to explain the results of the game. The aim was to test the use of this kind of game in meeting with stakeholders to learn and develop shared views. Furthermore the aim was to gather feedback for further development of the game.

Method of working
The participants of the test played in teams of two and three people after an explanation and a plenary demonstration. Afterwards an evaluation form was filled in and the experiences with the game were discussed. The participants gave recommendations for the further development of the game.

The group was made diverse with civil servants from several government agencies, ngo's and a concerned inhabitant. The majority of the participants was not used to playing computer games and is not very active on social media.

Results
We observed a lot of interaction between players about management decisions and results of these decisions when playing the game. Some players made their wildest dreams about the management of the estuary come true. When evaluating the game afterwards they indicated that they liked the game as a tool that was both fun and educational when starting conversations. Playing the game also provided a relaxed atmosphere in the group, which made talking about difficult subjects easier.

Results from the evaluation form (scores are on a scale from 1 to 10):

- I thought the game was realistic: 7,4
- The difficulty of the game corresponded with my own level of knowledge: 7,3
- By playing the game I have gained a better understanding of management of estuaries: 7,3
- I can apply the lessons I learned while playing the game in my own work: 6,8
- I thought playing the game was fun: 8,1

In Appendix 1: Evaluation form. The evaluation form from the final conference (because this one was in English) can be found in Appendix 1. The evaluation forms were more or less the same for the different sessions.

However, some participants did tend to use the game as a decision supporting model. For instance to calculate their own political preferences. This was not the intent in creating the game, which has to be made clear.

Estuary managers playing together

We also asked them which applications people saw for the game and in which setting the game could be used. Four options were presented:

- Individual use (e.g. at home on the internet)
- In small groups of 2 or 3 people during workshops or information sessions
- In a bigger group with a moderator to facilitate the discussion of the results
- Other, such as….

In a group setting there was a preference and enthusiasm for using the game in an organised setting in which people would play the game in small groups. Another possibility would be to publish the game online (e.g. via the website of VNSC), developing it further for educational use or making it available to visitor centres around estuaries.

3.4.3 Playing the game with students of the University of Applied Sciences Vlissingen

Aim

The next version of the game was tested with a group of students from the Water management and Delta management studies at the University of Applied Sciences Zeeland. We decided to play the game with students for several reasons:

- They are the next generation of estuary managers
- They are generally more skilled with computer games
- Although EMOVE made the choice to work intensively with stakeholders (from stakeholder to shareholder) the process approach was still relatively traditional. The participants of the sessions represent followers, they gather in an organised setting and are not really used to gaming and meeting online. In the future social media and temporary networks will start playing a larger role in management, policy and decision-making. We expect a different perspective on this from the students.

Students playing the game

The goal of the session is:

- Testing the game with a group of young students that are not involved with stakeholders at the Schelde yet.
- Getting suggestions for further use and possible extended development after the game after the EMOVE project.

Method of working

This test session was not part of a regular lecture for the students, but the students were asked to volunteer for this session. The test was performed with a group of 6 male students, most of them experienced gamers, and 3 lecturers (without game experience). The students played the game individually after a very short explanation of the game. The had basic understanding of the functioning of estuaries.

Results

We observed that the students were very concentrated while playing the game. They worked very straightforward to a balanced score of the different criteria. We noticed that they were experienced in looking for the right measures/management options in order to reach a certain goal. This strategic skill is important in playing most games. The students used this skills to manage the estuary. After playing individually for a while they start discussing the results with their fellow students.

Results from the evaluation form (scores are on a scale of 1 to 10, 10 = completely agree):

- I thought the game was realistic: 7,5
- The difficulty of the game corresponded with my own level of knowledge: 7,8
- By playing the game I have gained a better understanding of management of estuaries: 7,7
- I can apply the lessons I learned while playing the game in my own work: 7,6
- I thought playing the game was fun: 7,9

Both students and teachers really wanted to have an overview of their actions (management strategies) and the results. We decided to add this component to the game during the EMOVE-project.

The students saw great benefits of using this game as teaching material in class. Especially the more experienced gamers mentioned possibilities for further development of the game like the possibility for adjusting the dredging and depositing places and amounts, adding building blocks as nature friendly dikes or connecting the game to a modelling program. These kind of changes of the game are certainly interesting for the future, but are not possible during the EMOVE project, which ends March 2015.

3.4.4 Workshop during final conference

Aim

During the final conference of the EMOVE project on the 4th of March 2015 in Antwerpen the attendants were able to choose from three different workshops. One of the workshops was about the IVCP. The aim of the workshop was to present the estuary management game and to let the people experience playing the game.

Method of working

The workshop was held twice. Bothe sessions took 50 minutes. The workshop started with a short introduction about the aim of the use of innovative virtual tools, a demonstration of the tools that have been made and an introduction to the estuary management game. After that several laptops with the game were available for the people to play the game. Most of the attendants of the workshops played in groups of two people, some of them played individually.

Afterwards they individually filled out an evaluation form about their experiences.

Results

We observed that people were very concentrated while playing the game, trying to get good results for managing the estuary. However, the results were not always immediately clear to them. They started discussing them and asked questions to the workshop leaders about the results. Most of them enjoyed playing the game. There was not enough time to share the results in short plenary sessions. That was unfortunate, because these sessions proved to be very effective to get the best learning results about the estuarine processes.

The attendants gave the following marks for EMOVER (scores are on a scale of 1 to 10, 10 = completely agree):

- I thought the game was realistic: 7,1
- The difficulty of the game corresponded with my own level of knowledge: 6,9
- By playing the game I have gained a better

EMOVER in Antwerp

understanding of management of estuaries: 6,9
- I can apply the lessons I learned while playing the game in my own work: 6,4
- I thought playing the game was fun: 7,6
- I would others recommend to play the game:7,7

We received several recommendations for further use in processes about estuary management with stakeholders and using the game as educational tool at schools. People asked to get the game available on the internet. During the conference it was decided to make the game available on the EMOVE website.

4. Evaluation and recommendations

4.1 Introduction

The aim of EMOVE was to work on a joint vision on the sustainable management of estuaries and to turn stakeholders into committed shareholders. The complex and dynamic nature of the natural system was mentioned as a factor that complicated communication about and governance of the estuaries. Stakeholders and estuarine managers are in need of accessible communication tools, which could provide insight on the complexity of the system. No long reports or brochures, but new, innovative tools.

The aim of building, testing and evaluating the IVCP was to learn about the possible use of innovative communication tools in international projects dealing with spatial issues. In this chapter we will explain what we learned and we will make recommendations for the future. We will link these lessons and recommendations to the Governance Vision that was set up in the EMOVE project.

4.2 Evaluation: lessons learned

- Estuary managers are in need of tools for explaining the complex operation of the estuary, with which 3D-visualisations could help. The EMOVE project showed us the importance of the creation of shared views about the functioning of the estuaries by stakeholders. This helps them create a collective dialogue (Governance Vision, EMOVE).
- Realistic 3D virtual representations of the estuaries can help to facilitate the communication with and between stakeholders about the management of the estuaries.
- It helps to get better understanding of the physical processes in the estuary and to develop shared views on the functioning and the management of the estuary.
- Stakeholders playing the estuary game together improves the group atmosphere, which makes talking about difficult or sensitive subjects easier.
- Generally speaking, the estuary managers from the EMOVE project prefer direct communication with stakeholders over online communication with stakeholders. The 3D-visualisations produced by EMOVE are used in these kind of sessions with stakeholders in order to explain the complex natural system, as a starting point for further dialogue.
- The estuary game allowed stakeholders to take on the role of estuary manager, by actually taking on tasks of the manager.
- Online communication with and between stakeholders is yet a bridge too far in common stakeholder processes about estuary management. Even the Linkedin group of the EMOVE project was not regularly used by the stakeholders and the project partners.
- Stakeholders in organisations are often very limited in their abilities of playing “serious games” and installing plug-ins, because of (safety)settings in the computer networks of said organisations. Meeting online during working hours has often been proved as impossible.
- To summarize:
- The use of interactive, virtual, 3D serious games:
- Helps in developing an open dialogue between stakeholders and experts.
- Helps in developing a shared view on the functioning of the system.
- Can help in communication to a broader audience
- Can be developed for educational purposes.
- Can help in learning and internalizing the estuary, its functioning and its possibilities by all stakeholders and thus help to create a common ground for developing shareholders and finally guardianship.\

4.3 Recommendations

In the EMOVE project the development of the IVCP was meant as a test. The goal was to find out what the role of the IVCP could be in international projects.

- Online meetings seem to be too difficult for the groups of people we had to deal with in the EMOVE project, but seeing the developments in society we recommend continuing searching for ways to use the IVCP in ways that fit the target audience and the available technology.
- Interactive, virtual 3D visualisations can be used in dialogue with and between

stakeholders more often. Especially projects with a spatial component lend themselves to this.

- Serious gaming can play a role in the education of future estuary managers.
- The estuary game that is produced within the project is finished, but could be developed further on the following points:
- We recommend making the game available with an explanation on the internet via estuary managing agencies, like the Flemish-Dutch Schelde Commission (VNSC)
- At this point in time the game is only available in English. Language modules could be added.
- The information in the game could be extended, strengthening the educational character of the game.
- Different playing levels can be added.
- An educational version could be developed.

Appendix 1: Evaluation form workshop Estuary Management game

Evaluation form Estuary game Final conference EMOVE March 4th Antwerpen

About the game
You are asked to score from 1 to 10. 1 if the statement is not valid for you at all, 10 if it totally applies to your opinion.

1. **I thought the game was realistic.**
   1 2 3 4 5 6 7 8 9 10

2. **The difficulty of the game corresponded with my own level of knowledge.**
   1 2 3 4 5 6 7 8 9 10

3. **By playing the game I have gained a better understanding of management of estuaries.**
   1 2 3 4 5 6 7 8 9 10

4. **I can apply the lessons I learned while playing the game in my own work.**
   1 2 3 4 5 6 7 8 9 10

5. **I thought playing the game was fun.**
   1 2 3 4 5 6 7 8 9 10

6. **I would recommend others to play the game.**
   1 2 3 4 5 6 7 8 9 10

7. **Which possible use do you see for the game? (you can choose more than one)**
   - o Individual use (e.g. at home on the internet)
   - o In small groups of 2 or 3 persons during workshops or information sessions
   - o In a bigger group with a moderator to facilitate the discussion of the results
   - o In schools as tool for education
   - o Other, such as……

Which suggestions do you have for further development and/or application of the game? (u mag ook in het Nederlands antwoorden)

We would like to ask you some questions about yourself. The forms will only be used anonymously.

8. What kind of organisation do you represent?

- o Government
- o Private company
- o Education
- o NGO
- o Political party
- o None
- o Other , ...

9. Age

- o 0-19
- o 20-29
- o 30-39
- o 40-49
- o 50-64
- o 65 years and older

10. Gender (circle the applicable answer)

Male/female

11. I use social media (LinkedIn, Facebook, Twitter, etc.) for business purposes

1 2 3 4 5 6 7 8 9 10

12. I use social media (Facebook, Twitter, etc.) in my private life

1 2 3 4 5 6 7 8 9 10

13. I play computer games (installed on my computer or online)

1 2 3 4 5 6 7 8 9 10

Thank you for your feedback!