bridge project

Vignettes

Gamified cases for master students, PhD students and supervisors

Research Integrity and Research Ethics in Citizen Science: Vignettes for master and doctoral students and their supervisors

2022

Bridging Integrity in Higher Education, Business and Society

Co-funded by the Erasmus+ Programme of the European Union (2020-1-SE01-KA203-007)

Follow us on social media:

@projectbridge

@infobridgeproject

www.academicintegrity.eu/wp/bridge/

bridgeinfo@academicintegrity.eu

Vignettes

Gamified cases for master students, PhD students and supervisors

Contents

Introduction

Citizen science, in which researchers actively engage in co-research with members of society, is an increasingly common form of research. In citizen science projects, laypeople who are not themselves professional researchers are participating on a voluntary basis, for example, in collecting data. In some cases, laypeople may also be involved in formulating research questions and contributing to the study design (Resnik et al. 2015; Rasmussen 2021).

Just like any other research, citizen science raises a range of ethical questions and challenges related to research integrity. How do you make sure that all participants within a given project abide by good research practice? Should those contributing as citizen scientists also be listed as authors of research articles? Is there a risk that citizens may be unfairly instrumentalised or exploited? And what happens about informed consent? Yet citizen science is not a topic that is normally covered in courses on research ethics and research integrity.

As it is the responsibility of everyone in academia to help maintain integrity, it is essential that students and their supervisors receive appropriate training, including training in research ethics and research integrity in citizen science. To this end, we present a collection of gamified cases on research ethics and research integrity in citizen science in the form of nine vignettes.

The vignettes have been developed as an outcome of the Erasmus+ project *Bridging Integrity in Higher Education, Business and Society* (BRIDGE, 2020-1-SE01-KA203-077973). The vignettes have been developed by the project partners according to the template outlined in the report *Design of Educational Material Including Gamified Cases*. All vignettes were validated with BRIDGE project partners and piloted in the workshops with students and/or supervisors (e.g., used in the learning, teaching, and training events) (Table 1).

Table 1. Validation and piloting of vignettes.

Vignette	Validated	Piloted
Institutional oversight	10/08/2022	08/09/2022
Power balance	3/2/2023	26/10/2022
Conflict of interest	17/10/2022	08/09/2022
Informed consent	3/2/2023	26/10/2022
Privacy and confidentiality	17/10/2022	26/10.2022
Use of technology	17/10/2022	27/10/2022
Data management and verification of findings	17/10/2022	25/10/2022
Intellectual property	09/11/2022	26/10/2022
Ethical publishing		26/10/2022

The intended audience includes various learners, i.e., master's students, doctoral students, and their respective supervisors. The development of the vignettes draws on the *Guidelines for Research Ethics and Research Integrity in Citizen Science*. Each of the vignettes is based on the areas of concern identified in the *Guidelines*. Learners and facilitators (e.g., instructors and lecturers) who wish to use this educational material are therefore advised to read the corresponding topic(s) in the Guidelines as well.

Disclaimer

How to cite this report

BRIDGE project (2022). Design of educational material including gamified cases for master's students, PhD students, and supervisors: The vignettes (BRIDGE project, output 2 report).

How to cite a vignette (example)

Ozolinčiūtė, E. & Umbrasaitė, J. (2022). Institutional oversight. In BRIDGE project, Design of educational material including gamified cases for master's students, PhD students, and supervisors: The vignettes (BRIDGE project, output 2 report).

I. Institutional oversight

I. Learning objectives
• To identify and recognise research that needs to pass an institutional oversight process • To recognise and understand whether a given research design requires institutional oversight
II. Target group(s)
x Master's students x Doctoral students x Supervisors
III. Determining a story
Albert, a professor in biology, found out that in Europe, due to climate change, the summer temperature has changed. According to Climate ADAPT, European land temperatures have increased over the 2010–2019 period by 1.7–1.9°C. Since he has explored rare plant species for several decades, he is concerned about how this change could affect the habitat of the species studied. He is especially interested to learn whether the population of the species has started declining due to habitat loss. To identify the locations of the plant in different European countries, he has come up with the idea of inviting citizen scientists to contribute by providing visual geo-information. This could be accomplished only with the involvement of many citizen scientists from five European countries. Does Albert need to request ethical approval for this kind of research?
Answer options
1. There is no need for ethical review since the research does not concern human subjects. 2. Albert needs to find out whether ethical approval is required by his university. 3. Albert should determine whether the university grants an exemption from ethical review for such research. 4. Albert needs to find out whether ethical approval is required by his university and by the five involved European countries. 5. Albert needs to find out whether ethical approval is required by his university. He must get ethical approval in all five European countries in any case.
IV. Game design elements

Instructions	
Option A1 Topic-by-topic, individually	Option A2 Topic-by-topic with a facilitator (in team)
For learners: • familiarise yourself with the topic in the *Guidelines* (10 min), then • read the corresponding vignette (5 min), and • choose one answer option (5 min), • access the score and the feedback (1 min). Total duration: 25 min	For facilitators: • inform learners of the time allocated to read about the topic in the *Guidelines* (10 min), then • introduce the corresponding vignette (e.g., by reading) and the answer options (5 min), • explain how the answer options should be understood and emphasize that only one option may be chosen (2 min), • once the chosen answer options are reported, summarize the results and announce the right answer (5 min), • present scores for all answer options and discuss the options using feedback (5 min), and • actively moderate the discussion. Total duration: 30 min

Answer scores	
1. There is no need for ethical review since the research does not concern human subjects.	0
2. Albert needs to find out whether ethical approval is required by his university.	5
3. Albert should determine whether the university grants an exemption from ethical review for such research.	5
4. Albert needs to find out whether ethical approval is required by his university and by the five involved European countries.	10
5. Albert needs to find out whether ethical approval is required by his university. He must get ethical approval in all five European countries in any case.	5

Feedback
Human subjects are involved in the research as contributors of visual geo-information. This requires informed consent and relevant data management because personal data, including geo-information, will be collected. As not all European countries have established an ethical review procedure, Albert may need ethical approval in only some of them.

Developed by Eglė Ozolinčiūtė and Julija Umbrasaitė

II. Power balance (imbalance)

I. Learning objectives

- To recognize the existence of power imbalances within citizen science (CS) projects
- To understand the importance of recognizing the various expectations that people may have
- To provide solutions for how to best address power imbalances within CS projects

II. Target group(s)

x Master's students

x Doctoral students

x Supervisors

III. Determining a story

Joana is a second-year master's student in ecology and has recently been involved as a research assistant in a large project that aims to investigate how the bumblebee population is affected by the rising temperatures and climate change in southern Finland. Her main responsibility is to help collect data and, to a somewhat lesser extent, to compile the data. The project involves a large number of citizen scientists, and while Joana is employed by her university as a research assistant, most participants who help collect data are doing so on a voluntary basis. Some participate out of mere curiosity, some do it as a family activity, some are school teachers, and some are climate activists. Some of the volunteer citizen scientists have been part of the project for several years. Joana is now told by her colleagues at the university that they are planning to write a research article based on the results that they have gathered so far, intending to publish it in a scientific journal. They ask Joana whether she would like to be included as a co-author, given how she has contributed to the data collection. She wonders who else will participate in co-writing the report, and is told that it would be the researchers at her department, without the inclusion of the volunteer citizen scientists. Unlike the university-employed researchers in the project, the citizen scientists are assumed to lack the relevant academic training. Some of Joana's colleagues also say that the volunteers would likely not even be interested in co-authorship.

What should Joana do under these circumstances?

Answer options
1. Joana should accept the invitation to be a co-author. It would provide a perfect opportunity for her to get relevant credit and experience to secure an academic career. 2. Joana should accept the invitation to be a co-author, but to avoid potential conflicts between the researchers and the citizen scientists in the project, she should also make sure that the citizen scientists are properly acknowledged in the research article, for example, by being mentioned in the acknowledgements or the contributor statement. 3. Joana should try to convince her colleagues at the university of the importance of having an inclusionary dialogue with everyone involved in the project – including the citizen scientists – about the dissemination of research results and how they may like to be credited for their contributions. 4. Joana should decline the invitation to be a co-author because she has not been contributing as much to the study as have some of the citizen scientists. Accepting the invitation would be unfair and disrespectful towards those citizen scientists who have made larger contributions to the study than Joana has. 5. Joana needs to find out more about what it means to be a co-author of a research paper and to what extent it may be appropriate to include or exclude citizen scientists from co-authorship.
IV. Game design elements
Instructions

Option A1 Topic-by-topic, individually	Option A2 Topic-by-topic with a facilitator (in-team)
For learners: • familiarise yourself with the topic in the *Guidelines* (10 min), then • read a corresponding vignette (5 min), • choose one answer option (5 min), and • access the score and the feedback (1 min). • Follow-up discussion. Share your answers and discuss the choice you have made and the rationale behind the choice (10 min). Total duration: 35 min	For facilitators: • inform learners of the time allocated to read the topic in the *Guidelines* (10 min), then • introduce the corresponding vignette (e.g., by reading) and the answer options (10 min), • explain how the answer options should be understood and emphasise that only one answer option may be chosen (5 min), • once the chosen answer options are reported, summarise the results and announce the right answer (5 min), • present scores for all answer options and discuss the options using feedback (5 min), and • actively moderate the discussion. Total duration: 35 min

Answer scores	
1. Joana should accept the invitation to be a co-author. It provides a perfect opportunity for her to get relevant credit and experience to secure an academic career.	0
2. Joana should accept the invitation to be a co-author, but she should also make sure that the citizen scientists are properly acknowledged in the research article, for example, by being mentioned in the acknowledgements or contributor statement.	5
3. Joana should try to convince her colleagues at the university that they should at least have an inclusionary dialogue with everyone involved in the project – including the citizen scientists – about the dissemination of research results and how they would like to be credited for their contributions.	10
4. Joana should decline the invitation to be a co-author because she has not contributed as much as some of the citizen scientists. Accepting the invitation would be unfair and disrespectful towards those citizen scientists who have made larger contributions to the study than Joana.	5
5. Joana needs to find out more about what it means to be a co-author of a research paper and to what extent it may be appropriate to include or exclude citizen scientists from co-authorship.	5

Feedback
It is important to recognize that there may be a range of different power imbalances within a specific citizen project due to differences in academic level or training, and in how the people involved are compensated or credited for their work. Some of these imbalances may result in the exploitation and instrumentalisation of citizen scientists and related tensions between professional researchers and citizen scientists. For example, there is a risk that professional researchers, either knowingly or accidentally, might exploit the goodwill of citizen scientists due to different expectations regarding the project and its outputs. If citizen scientists do not feel that they are treated fairly or with the type of respect owed to them as persons, this might jeopardise the CS project and undermine future collaboration. It is therefore important that professional researchers take proactive responsibility to avoid the risk of exploiting or instrumentalising citizen scientists and encourage an inclusionary dialogue between professional researchers and citizen scientists. Although the form of communication that is suitable to this end depends on the scale and nature of the project, questions that should be addressed in such a dialogue are: Why do citizens wish to contribute and what do they wish to gain from participating in the project? How do they wish to be credited and how do they wish to contribute to the project? How do they want the information about the project as well as its data and results to be disseminated? The correct thing to do for Joana, then, is to try to convince her colleagues of the importance of having an inclusionary dialogue about these issues with everyone involved.

Developed by William Bülow O'Nils

III. Conflict of interest

I. Learning objectives
• To recognise a conflict of interest • To explain how to avoid possible conflict of interest
II. Target group(s)
□ Master's students x Doctoral students x Supervisors
III. Determining a story
Tina, a university student, is a member of the research team at the Department of Health and Society. Her research team is exploring the opportunities to launch a research project concerning the effects of noise on human health. Tina resides in an area suffering from high levels of noise pollution. The research team decides to choose that area, as the contribution of the residents in the area could bring good value to the project. Moreover, Tina's grandfather, who resides in the same area, officially complained to the municipality about noise issues in the area. He is usually a very proactive community member and for many years has been a leading representative* of the community in striving to solve the problems in the area. Since Tina is assigned to recruit citizen scientists, she thinks that her grandfather would be interested in joining the CS project. What should Tina do if her grandfather decides to participate in the research project as a citizen scientist? * Should not be linked to political activity.
Answer options
1. Surely, Tina's grandfather should be involved since he is a local from the area concerned and Tina could contribute to the CS project as planned. 2. Tina should consult her research team, informing them that her grandfather resides in the area concerned. 3. Tina should encourage her grandfather and neighbours to join the CS project. If her grandfather decides to join the CS project, Tina should inform the research team of his activities. 4. Tina should withdraw from the CS project if her grandfather is eager to join the CS project. 5. Tina should consult her research team, informing them that her grandfather resides in the area concerned and notifying them if she finds out that her grandfather has joined the CS project. Her grandfather should declare his activities to the research team.
IV. Game design elements
Instructions

Option A1 Topic-by-topic, individually	Option A2 Topic-by-topic with a facilitator (in-team)
For learners: ● familiarise yourself with the topic in the *Guidelines* (10 min), then ● read the corresponding vignette (10 min), ● choose one answer option (4 min), and ● access the score and the feedback (1 min). Total duration: 25 min	For a facilitator: ● inform learners of the time allocated to read the topic in the *Guidelines* (10 min), then ● introduce the corresponding vignette (e.g., by reading) and the answer options (10 min), ● explain how the answer options should be understood and emphasise that only one answer option may be chosen (5 min), ● once the chosen answer options are reported, summarise the results and announce the right answer (5 min), ● present scores for all answer options and discuss the options using feedback (5 min), and ● actively moderate the discussion. Total duration: 35 min

Answer scores	
1. Surely, Tina's grandfather should be involved since he is a local from the area concerned and Tina could contribute to the CS project as planned.	0
2. Tina should consult her research team, informing them that her grandfather resides in the area concerned.	5
3. Tina should encourage her grandfather and neighbours to join the CS project. If her grandfather decides to join the CS project, Tina should inform the research team of his activities.	5
4. Tina should withdraw from the CS project if her grandfather is eager to join the CS project.	5
5. Tina should consult her research team, informing them that her grandfather resides in the area concerned and notifying them if she finds out that her grandfather has joined the CS project. Her grandfather should declare his activities to the research team.	10

Feedback
The research team should be informed of all possible conflicts of interest at all stages of a CS project. The research team should carefully consider each (potential) conflict of interest. The principal investigator should clearly inform each research team member of how risks of conflict of interest are to be mitigated. Researchers should discuss with citizens the issues regarding potential conflicts of interest due to their financial and non-financial activities and the importance of declaring conflicts of interest. Moreover, researchers should also carefully consider both their potential financial and non-financial conflicts of interest and disclose them whenever they occur.

Developed by Eglė Ozolinčiūtė and Julija Umbrasaitė

IV. Informed consent

I. Learning objectives
1. To identify research that needs informed consent 2. To recognize the criteria that are needed in order to formulate an informed consent form 3. To identify vulnerable groups and know what applies to them regarding informed consent
II. Target group(s)
x Master's students x Doctoral students □ Supervisors
III. Determining a story
Andrea is a master's student in linguistics who lives in a multicultural city and would like to find out what languages are used in the graffiti and sticker art in the public spaces in that city. Inspired by CS, she contacts a group of teenagers who are active graffiti artists and asks them to help her collect photos of the graffiti and/or stickers and send her their exact GPS positions, the times when the photos were taken, the names of the languages, and translations of the text. Most of the teenagers are active in a nearby youth centre. She also needs contact information for her volunteers, as well as information on their background and language proficiency in order to validate that their knowledge of the languages is sufficient for her project. As she is using the help of laypeople to obtain data for her research, her supervisor has explained that she needs to obtain informed consent, so she writes a short form for her volunteers to sign. Although she might want to use the translations provided by the volunteers in a future doctoral study, she only states that the data will be used in her Master's thesis. Both volunteers and Andrea are eager to start as soon as possible, so she is happy to get the teenagers' signatures without any further questions. One of the teenagers knows that his friend, who is sick that day, loves graffiti and would love to participate in the research, so he signs the informed consent for her as well. Is the informed consent Andrea requires from the participants necessary and sufficient?
Answer options
1. As Andrea's research is not about the volunteering citizen scientists, but about graffiti and sticker art, she does not need to obtain informed consent at all, even though she follows the supervisor's requests. 2. As Andrea is collecting information on volunteers as well, for example, about their background, language skills, and GPS locations, she needs to obtain informed consent. Her informed consent form is sufficient for her Master's thesis, but not for a doctoral thesis, so she renegotiates the consent using a dynamic informed consent form. As her research involves children and adolescents as citizen scientists, she also needs to obtain consent from their legal guardians. 3. As Andrea is collecting information on volunteers as well, for example, about their background, language skills, and GPS locations, she needs to obtain informed consent. Andrea needs to find out more about how the informed consent form should be formulated. The

information provided about the research is not sufficient for either her Master's or a doctoral thesis. As her research involves children and adolescents as citizen scientists, she needs to obtain consent from their legal guardians. She should not have accepted the informed consent form signed on behalf of someone else.

4. Andrea needs to find out more about how the informed consent form should be formulated. Andrea should provide more information about the aims and methods of her research to those participating as citizen scientists in her thesis research. As her research involves children and adolescents as citizen scientists, she needs to obtain consent from their legal guardians. It is appropriate to accept the informed consent form signed on behalf of someone else as it can be confirmed later.

5. Andrea's informed consent form is sufficient for both her Master's and a doctoral thesis. The second thesis would be a continuation of the first thesis, so she can use the same informed consent for both. Informed consent is important in this case as she is collecting information about her volunteers as well. Andrea's informed consent form is sufficient as all of her volunteers are older than 12 years. It is appropriate to accept the informed consent form signed on behalf of someone else as it can be confirmed later.

IV. Game design elements

Instructions

Option A1 Topic-by-topic, individually	Option A2 Topic-by-topic with a facilitator (in-team)
For learners: • familiarise yourself with the specific topic in the *Guidelines* (10 min), then • read the corresponding vignette (10 min), • choose one answer option (4 min), and • access the score and the feedback (1 min) • Follow-up discussion. Share your answers and discuss the choice you have made and the rationale behind the choice (10 min). Total duration: 35 min	For a facilitator: • inform learners of the time allocated to read a specific topic in the *Guidelines* (10 min), then • introduce the corresponding vignette (e.g., by reading) and the answer options (10 min), • explain how the answer options should be understood and emphasize that only one answer option may be chosen (5 min), • once the chosen answer options are reported, summarise the results and announce the right answer (5 min), • present scores for all answer options and discuss the options using feedback (5 min), and • actively moderate the discussion. Total duration: 35 min

Answer scores	
1. As Andrea's research is not about the volunteering citizen scientists, but about graffiti and sticker art, she does not need to obtain informed consent at all, even though she follows the supervisor's requests.	0
2. As Andrea is collecting information on volunteers as well, for example, about their background, language skills, and GPS locations, she needs to obtain informed consent. Her informed consent form is sufficient for her Master's thesis, but not for a doctoral thesis, so she renegotiates the consent using a dynamic informed consent form. As her research involves children and adolescents as citizen scientists, she also needs to obtain consent from their legal guardians.	5
3. As Andrea is collecting information on volunteers as well, for example, about their background, language skills, and GPS locations, she needs to obtain informed consent. Andrea needs to find out more about how the informed consent form should be formulated. The information provided about the research is not sufficient for either her Master's or a doctoral thesis. As her research involves children and adolescents as citizen scientists, she needs to obtain consent from their legal guardians. She should not have accepted the informed consent form signed on behalf of someone else.	10
4. Andrea needs to find out more about how the informed consent form should be formulated. Andrea should provide more information about the aims and methods of her research to those participating as citizen scientists in her thesis research. As her research involves children and adolescents as citizen scientists, she needs to obtain consent from their legal guardians. It is appropriate to accept the informed consent form signed on behalf of someone else as it can be confirmed later.	5
5. Andrea's informed consent form is sufficient for both her Master's and a doctoral thesis. The second thesis would be a continuation of the first thesis, so she can use the same informed consent for both. Informed consent is important in this case as she is collecting information about her volunteers as well. Andrea's informed consent form is sufficient as all of her volunteers are older than 12 years. It is appropriate to accept the informed consent form signed on behalf of someone else as it can be confirmed later.	5

Feedback
When a CS project involves humans as citizen scientists and research subjects, informed consent should be obtained. Although Andrea could later renegotiate the consent using a dynamic informed consent form, she does not provide enough information about her research in the first place, so her informed consent form is insufficient for her Master's thesis. She needs to find out more about appropriate informed consent forms and specify the aims and purposes of her research, the research methodology, the risks and benefits associated with participation, what measures will be taken to protect participants' rights and integrity, and the dissemination of results. She also needs to clarify that the participants can withdraw their consent at any time and she may not accept the informed consent signed on behalf of someone else. As her research involves children and adolescents, who are vulnerable groups, she needs to obtain consent from their legal guardians as well. The informed consent form cannot be signed on behalf of someone else. As citizen scientists often actively participate in CS projects not only as research subjects but also as co-creators, it might be relevant to use a dynamic informed

consent form that allows the participants to select which data can be shared and under what circumstances during different stages of the project.

Developed by Sonja Bjelobaba

V. Privacy and confidentiality

I. Learning objectives
• To understand data collection issues and violations • To recognize data collection issues and violations • To identify personal data protection violations • To resolve personal data protection violations
II. Target group(s)
x Master's students x Doctoral students x Supervisors
III. Determining a story
The Research Innovations Centre has recently received a proposal to investigate a cogeneration power plant that was recently built in the city. The initial goal of the study is to explore the experiences of the local people regarding the pollution caused by the cogeneration power plant. Mark and Taylor, researchers at the Research Innovations Centre, invited local NGO personnel to contribute to the research by collecting data together with the researchers. In the first project meeting, the NGO's leader, Ana, expresses the expectation that the study should reveal that the city is suffering from pollution caused by the cogeneration power plant. The leader of the NGO also insists that Mark and Taylor collect the data from a group of local people specified by her. She explains that these are the local people who have already written complaints about the cogeneration power plant to the relevant state institution. According to Ana, the state institution will provide the contact details (e.g., names, surnames, and email addresses) of the people who filed the complaints. In the meeting, Ana also said that NGO personnel had already collected some interviews about local people's experiences. During the meeting, it appeared to Mark that the NGO wanted to obtain particular research results and conclusions. After Mark expressed his concerns to Taylor, they explained to Ana that this method of reaching local people contradicts the principles of personal data protection and raises ethical questions concerning the protection of the personal data of the research subjects. What should Mark and Taylor do?

Answer options
1. The researchers should continue working with the NGO personnel in the project: as the state institution provides the contact data, it is also responsible for issues concerning the protection of the personal data. 2. The researchers should ask the NGO's leader, Ana, to withdraw from the study due to inadequate data protection and non-compliance with research ethics principles. 3. The researchers should ask the NGO's leader, Ana, to select other, unbiased informants to participate in the research. 4. Before the project starts, the researchers should explain to the NGO personnel the privacy and confidentiality details of the CS project and that they should agree to the terms and conditions of the research. They should also explain what personal information may and may not be collected, how it is to be shared, and what actions should be taken to prevent or limit its potential misuse.

IV. Game design elements	
Instructions	
Option A1 Topic-by-topic, individually	Option A2 Topic-by-topic with a facilitator (in-team)
For learners: ● familiarise yourself with the topic in the *Guidelines* (10 min), then ● read the corresponding vignette (10 min), ● choose one answer option (4 min), and ● access the score and the feedback (1 min). ● Follow-up discussion. Share your answers and discuss the choice you have made and the rationale behind the choice (10 min). Total duration: 35 min	For a facilitator: ● inform learners of the time allocated to read the topic in the *Guidelines* (10 min), then ● introduce the corresponding vignette (e.g., by reading) and the answer options (10 min), ● explain how the answer options should be understood and emphasize that only one answer option may be chosen (5 min), ● once the chosen answer options are reported, summarise the results and announce the right answer (5 min), ● present scores for all answer options and discuss the options using feedback (5 min), and ● actively moderate the discussion. Total duration: 35 min

Answer scores	
1. The researchers should continue working with the NGO personnel in the project: as the state institution provides the contact data, it is also responsible for issues concerning the protection of the personal data.	0
2. The researchers should ask the NGO's leader, Ana, to withdraw from the study due to inadequate data protection and non-compliance with research ethics principles.	5
3. The researchers should ask the NGO's leader, Ana, to select other, unbiased informants to participate in the research.	5
4. Before the project starts, the researchers should explain to the NGO personnel the privacy and confidentiality details of the CS project and that they should agree to the terms and conditions of the research. They should also explain what personal information may and may not be collected, how it is to be shared, and what actions should be taken to prevent or limit its potential misuse.	10

Feedback
Mark and Taylor should explain to the NGO that all the information collected in the CS project about the case of potential pollution, including information on those who provided the data, should be kept securely and confidentially. Researchers are obliged to inform the citizen scientists involved in the project of technical details concerning the collection and treatment of personal information; in this case, researchers must inform NGO personnel and ensure that all the participants in the project follow the procedures. Mark and Taylor have to ensure that the personal data on research subjects are kept securely to avoid personal data protection violations. Researchers, in this case, must ensure that NGO personnel are aware of the privacy and confidentiality details of the CS project and agree to the terms and conditions of the research, for example, that the data must be password protected with limited access and not be available to third parties. The research subjects who provide information must know that their personally identifiable data (in this case, concerning complaints) will be held fully confidentially.

Developed by Sonata Vyšniauskienė

VI. Use of technology

I. Learning objectives
• To select a technological solution that has an optimal value trade-off between usefulness and privacy • To distinguish technological solutions that do not discriminate • To identify personal data (related also to the section “Privacy and confidentiality”)
II. Target group(s)
x Master’s students x Doctoral students □ Supervisors
III. Determining a story
As part of her thesis, Lea is doing research on food waste in households in her city. The idea is to engage people from all different types of households to make daily records of the food they bought and threw away. For each household, she needs to know basic demographic data such as the location, number of household members, and monthly income. Lea’s supervisor has suggested that Lea provide participants in the research with paper spreadsheets to fill in. But Lea really doesn’t like the idea of the paper records as they did not work well in the pilot among her friends, who often lost them. Lea is therefore seeking a technological solution for data collection appropriate for the 21st century. She is considering four technical solutions: 1) An app called MyFood, available for smartphones, that is free for Android users and costs a small fee for iPhone users. The app enables the convenient collection of data and has many additional functions – users can record their weight, exercise, calorie intake, health issues, etc. So, using this app might be beneficial for the people involved in the research as well: they would not only collect data for Lea’s research, but also do something for themselves. The app also has a “buddy” feature that enables users to share the data from the app with someone else. If Lea asks the participants to add her as a “buddy”, the data from their app would be synchronized every day with her phone and she could easily export the data she needs and ignore the rest. 2) A web application for data collection offered to all students and researchers from the university for their research. The app was developed a long time ago, has been used by many researchers, and has a maintenance team. If Lea makes an official request, which might take some time, then she will get administration access and can configure the application as needed. The configuration is complicated and not user friendly, but she could get help with it. The user interface for research participants is easy to manage and works well on a smartphone or computer, although it looks quite ugly. People don’t need to provide their email address to log

in; rather, Lea will simply provide them with a unique login number. The data will be stored on the university server, which Lea can easily access from her administration interface.

3) As Lea isn't sure whether she can manage the complicated administration interface of the university web application, she is considering converting the paper spreadsheet into a Google Sheets spreadsheet. Each participant would have their own file in which to record the demographic data about the household and the everyday food data.

4) Regarding spreadsheets, what about using offline spreadsheets in MS Excel and sending them to people via email? People would fill them in offline and then return them to her via email back.

Which of the solutions should Lea choose?

Answer options

1. The MyFood app for smartphones
2. The university web application
3. Google Sheets spreadsheet
4. MS Excel spreadsheet collected via email

IV. Game design elements

Instructions

Option A1 Topic-by-topic, individually	Option A2 Topic-by-topic with a facilitator (in-team)
For learners: • familiarise yourself with the topic in the *Guidelines* (10 min), then • read the corresponding vignette (10 min), • choose one answer option (4 min), and • access the score and the feedback (1 min). Total duration: 25 min	For a facilitator: • inform learners of the time allocated to read the topic in the *Guidelines* (10 min), then • introduce the corresponding vignette (e.g., by reading) and the answer options (10 min), • explain how the answer options should be understood and emphasize that only one answer option may be chosen (5 min), • once the chosen answer options are reported, summarise the results and announce the right answer (5 min), • present scores for all answer options and discuss the options using feedback (5 min), and • actively moderate the discussion. Total duration: 35 min

Answer scores	
1. MyFood app	0
2. The university web application	10
3. Google Sheets spreadsheet	5
4. MS Excel spreadsheet collected via email	5

Feedback

Data about the food bought and thrown away are not personal, but together with the demographic data about the household and the email address of a given person, they become personal. Therefore, Lea needs to be careful.

The MyFood app collects and shares far too much data (breaking the principle of "data minimalisation"; please see the chapter "Privacy and confidentiality" in the *Guidelines*), some of which are sensitive. The data are shared not only with Lea, but also with whoever is the app provider. It discriminates against iPhone users by requiring a small fee, and discriminates against everyone who doesn't have a smartphone or doesn't want to install the app.

With the Google Sheets spreadsheet, Lea will collect only the data necessary for the research, but the data will be shared with Google and probably stored on servers outside of Europe, which is not compliant with the GDPR. People need to use their email to access the Google Sheets spreadsheet conveniently, so they would be sharing their personal information (i.e., email address) with Google. It might be a good solution if used only for the food records, with the household data being collected/stored separately.

Even though an MS Excel offline spreadsheet seems not to have any of the above data privacy and confidentiality risks, it is necessary to consider the stage of collecting the filled-in spreadsheets via email. We don't know which email provider Lea uses, or where and how it stores the emails. The same goes for the email providers of the people involved in the research. At the moment of attaching the spreadsheet, it, together with all the data it contains, will be associated with the person's email address, and some people might also add their full name in the signature. Therefore, the drawbacks are comparable to those of the Google Sheets spreadsheet solution. Furthermore, this solution lacks the positives of the others: most people won't be able to edit an MS Excel spreadsheet on their smartphone, and some people might not have MS Excel (which is a paid application) or even its free open-source variation (e.g., OpenOffice or LibreOffice). Also, collecting many files via email is clumsy from Lea's perspective (e.g., she might "lose" some emails or emails might be diverted to spam).

The university-provided web application sounds ideal, as we can assume that an official faculty application that has been kept updated and is used by many researchers is safe and protects the user data well. In any case, no email addresses or other personal identifiers are associated

with the data when stored. The data are stored on institutional servers (which is a solution recommended in the chapter “Privacy and confidentiality” in the *Guidelines*). The web app can be used on all smartphones and on computers. We recommend that Lea not be put off by the complicated setup at the beginning, as she could get help with that.

Still, all these technological solutions exclude people who are unfamiliar with or unwilling to use smartphones and computers. Lea might consider offering people the paper spreadsheet as well, in order to reach the widest range of the population. Another inclusive solution might be to use audio recordings, but their collection and processing would need to be considered carefully.

In fact, one might find a wide variety of possible solutions and it is impossible to cover all of them in this simple exercise. This story and the possible options instead illustrate what issues might emerge and how a researcher should think about them.

Developed by Dita Henek Dlabolová

VII. Data management and verification of findings

I. Learning objectives
● To recognise improper data management ● To explain the importance of complying with data management responsibilities
II. Target group(s)
X Master's students X Doctoral students X Supervisors
III. Determining a story
Nick is an archaeology student who is involved in a CS project that collects and preserves artefacts. He is responsible for mentoring the citizen scientists during data collection and the provision of items for data validation. Accidentally, he finds out that some artefacts, such as pottery, were destroyed in the data collection stage, and due to the failure to ensure safe transportation to the museum, some pottery items were shattered. Therefore, concerns emerged about the accurate description of decoration techniques used in a certain century. Moreover, in view of the losses, the research team raises the question of who should take responsibility for them. Did Nick manage the data collection stage well?
Answer options
1. He did manage well, as the loss of the pottery items was not up to him. Now the research team must sort out who is responsible for what. 2. He should have made sure that the citizen scientists packed the pottery safely for transportation to prevent possible damage. 3. Although the research team was responsible for collecting the artefacts, since the artefacts had to be transported to the museum, the responsibility should be taken by the museum. 4. Nick was expected to instruct the citizen scientists beforehand about the rules of excavation and of artefact storage, loading, delivery, ownership, and associated responsibilities, and had to proceed with careful monitoring. 5. Nick is only a learner, and the research team should not expect him to instruct the citizen scientists beforehand about the rules of excavation and of artefact storage, loading, delivery, ownership, and associated responsibilities.
IV. Game design elements

Vignettes

Gamified cases for master students, PhD students and supervisors

Instructions	
Option A1 Topic-by-topic, individually	Option A2 Topic-by-topic with a facilitator (in-team)
For learners: ● familiarise yourself with the topic in the *Guidelines* (10 min), then ● read the corresponding vignette (5 min), ● choose one answer option (4 min), and ● access the score and the feedback (1 min). Total duration: 20 min	For a facilitator: ● inform learners of the time allocated to read the topic in the *Guidelines* (10 min; optional), then ● introduce the corresponding vignette (e.g., by reading) and the answer options (5 min), ● explain how the answer options should be understood and emphasize that only one answer option may be chosen (2 min), ● once the chosen answer options are reported, summarise the results and announce the right answer (10 min), ● present scores for all answer options and discuss the options using feedback (5 min), and ● actively moderate the discussion. Total duration: 32 min

Answer scores	
1. He did manage well, as the loss of the pottery items was not up to him. Now the research team must sort out who is responsible for what.	0
2. He should have made sure that the citizen scientists packed the pottery safely for transportation to prevent possible damage.	5
3. Although the research team was responsible for collecting the artefacts, since the artefacts had to be transported to the museum, the responsibility should be taken by the museum.	0
4. Nick was expected to instruct the citizen scientists beforehand about the rules of excavation and of artefact storage, loading, delivery, ownership, and associated responsibilities, and had to proceed with careful monitoring.	10
5. Nick is only a learner, and the research team should not expect him to instruct the citizen scientists beforehand about the rules of excavation and of artefact storage, loading, delivery, ownership, and associated responsibilities.	5

Feedback
The research team (including a student involved in a CS project) should provide appropriate training to citizen scientists on good record-keeping practices both before and throughout the research. The training should encompass all details relevant to the research. Also, the division of responsibilities should be made explicit given the diverse stakeholders involved (e.g., research team, museum, student, and citizen scientists) and the potential consequences of failure to meet these responsibilities should be explained. Such failure would impede the application of data validation methods.

Developed by Eglė Ozolinčiūtė and Julija Umbrasaitė

VIII. Intellectual property

I. Learning objectives
• To identify emerging issues of intellectual property (IP) rights in research activities when dealing with CS projects • To demonstrate compliance with IP principles and good practices in research design • To differentiate ethical practices related to IP for context-related circumstances
II. Target group(s)
x Master's students x Doctoral students □ Supervisors
III. Determining a story
Nicola is a doctoral student in marine biology. Currently, he is collecting data for his doctoral thesis on the depth of a newly discovered lake underneath an ice sheet in northern Greenland. Due to bad weather, hostile conditions, and a limited budget, Nicola reaches out to the local community to benefit from their knowledge and experience of the area and for help in making measurements in such a difficult environment. Following up on the advice of his mentor, Nicola also needs citizen scientists to increase the number of illustrative measurements and therefore improve the accuracy of the research. Citizen scientists would provide measurements from a greater variety of locations across the research area. Nicola provides the necessary information about the location where the measurements need to be made, trains the citizen scientists, and provides the tools to make the measurements based on international IP-rights standards. The citizen scientists make the measurements and deliver the data as required, contributing to the successful completion of the data collection process. One of the citizen scientists politely asks Nicola to provide the overall findings of the data collection process prior to his final defence. Nicola refuses to share the data that have been collected by him or anyone else in the project, including other citizen scientists, with the justification that such a request would require further data processing followed by verification steps until the data can be fully disclosed. Also, the collected data are to be used to support the thesis hypothesis, making them subject to IP rights. Therefore, the data cannot be shared until the thesis is defended. Has Nicola displayed ethical behaviour in his research activities involving CS?

Answer options
1. There is no need for Nicola to share the data of his PhD thesis since the data require further processing by him, making them subject to IP rights. 2. Nicola needs to find out if sharing the data prior to his thesis defence can be considered a violation of the academic integrity policies of his university. 3. Nicola should share the data once the thesis has been defended, requesting proper acknowledgment of the source, i.e., the thesis. 4. Nicola should have discussed the terms and conditions of the data ownership with the citizen scientists before they made the measurements, and agreed to share the data at any stage of the study. 5. Nicola is in violation of generally accepted ethical standards within the academic community.

IV. Game design elements	
Instructions	
Option A1 Topic-by-topic, individually	Option A2 Topic-by-topic with a facilitator (in-team)
For learners: ● familiarise yourself with the topic in the *Guidelines* (10 min), then ● read the corresponding vignette (10 min), ● choose one answer option (4 min), and ● access the score and the feedback (1 min). ● Follow-up discussion. Share your answers and discuss the choice you have made and the rationale behind the choice (10 min). Total duration: 35 min	For a facilitator: ● inform learners of the time allocated to read the topic in the *Guidelines* (10 min), then ● introduce the corresponding vignette (e.g., by reading) and the answer options (10 min), ● explain how the answer options should be understood and emphasize that only one answer option may be chosen (5 min), ● once the chosen answer options are reported, summarise the results and announce the right answer (5 min), ● present scores for all answer options and discuss the options using feedback (5 min), and ● actively moderate the discussion. Total duration: 35 min

Answer scores	
1. There is no need for Nicola to share the data of his PhD thesis since the data require further processing by him, making them subject to IP rights.	0
2. Nicola needs to find out if sharing the data prior to his thesis defence can be considered a violation of the academic integrity policies of his university.	5
3. Nicola should share the data once the thesis has been defended, requesting proper acknowledgment of the source, i.e., the thesis.	5
4. Nicola should have discussed the terms and conditions of the data ownership with the citizen scientists before they made the measurements, and agreed to share the data at any stage of the study.	10
5. Nicola is in violation of generally accepted ethical standards within the academic community.	5

Feedback
The *Guidelines for Research Ethics and Research Integrity in Citizen Science* recommend that citizen scientists must be informed of issues related to IP, preferably at the beginning of the project. These data ownership issues need to be thoroughly discussed with the citizen scientists, researchers, and other contributors, addressing the extent to which such ownership is limited. In the case of Nicola, he will need to share information with the citizen scientists at any stage of the doctoral thesis and maintain open access to the data for all contributors equally, regardless of the timing when the access has been requested.

Developed by Hajrulla Harjullai & Veli Kreci

IX. Ethical publishing

I. Learning objectives
● To recognize ethical issues when publishing the results of CS projects ● To identify appropriate open access and legitimate research outlets ● To properly acknowledge CS contributors
II. Target group(s)
x Master's students x Doctoral students □ Supervisors
III. Determining a story
Mike is a doctoral student in Public Health. He studies the relationship between food choice and health in a certain region. Mike's doctoral project is part of a CS project carried out by the NGO Healthy Nutrition. The project includes a significant number of volunteers who collect data on their food choices. Mike's friend Frank is a second-year Master's student specialising in sociology who is writing a thesis at the same NGO, of which Frank's uncle Ben is a co-director. Last week, Mike was invited to be a co-author of a paper that summarises the results of gathering and analysing data from citizen scientists within the CS project. Mike read the draft of the paper and some things surprised him. Mike knows that the conclusions of the paper are mainly based on the results of Frank's analysis, but unlike the citizen scientists participating in the project, Frank's work was paid for by Healthy Nutrition. Mike also knows that Frank has poor statistical skills. However, the paper does not contain information about Frank's contributions or any disclosure statements. Also, Mike notices that there are no references in the paper to the volunteers' participation in the CS project, although the paper contains the names and photographs of some citizen scientists without their consent. Mike wonders whether he should accept the invitation to be a co-author.

Answer options
1. No, he shouldn't because there is violation of several ethical principles. Mike should suggest to the team that they should properly declare who has contributed to this publication, including Frank, for the publication to be compliant with ethical principles. 2. No, he shouldn't as the publication is unethical due to Frank's undeclared financial interest. The paper will comply with ethical principles after Frank writes the relevant declaration of interest or disclosure statement. 3. Yes, he should accept the co-authorship as there are no problems with the ethics of publication. 4. No. There are several ethical problems due to undeclared financial interests, poor analysis, failure to give appropriate credit to citizen scientists and other contributors and/or co-authors, inclusion of the citizen scientists' personal information without consent, etc. Mike should address these problems with the co-authors and advise them to provide all necessary declarations and references as well as to obtain consent or delete all sensitive personal information about the citizen scientists. 5. Yes, but only if the co-authors delete the citizen scientists' names and photos from the paper.
IV. Game design elements
Instructions

Option A1 Topic-by-topic, individually	Option A2 Topic-by-topic with a facilitator (in-team)
For learners: ● familiarise yourself with the specific topic in the *Guidelines* (10 min), then ● read the corresponding vignette (10 min), ● choose one answer option (4 min), and ● access the score and the feedback (1 min). ● Follow-up discussion. Share your answers and discuss the choice you have made and the rationale behind the choice (10 min). Total duration: 35 min	For a facilitator: ● inform learners of the time allocated to read a specific topic in the *Guidelines* (10 min), then ● introduce the corresponding vignette (e.g., by reading) and the answer options (10 min), ● explain how the answer options should be understood and emphasize that only one answer option may be chosen (5 min), ● once the chosen answer options are reported, summarise the results and announce the right answer (5 min), ● present scores for all answer options and discuss the options using feedback (5 min), and ● actively moderate the discussion. Total duration: 35 min

Score for each answer option	
1. No, he shouldn't because there is violation of several ethical principles. Mike should suggest to the team that they should properly declare who has contributed to this publication, including Frank, for the publication to be compliant with ethical principles.	5
2. No, he shouldn't as the publication is unethical due to Frank's undeclared financial interest. The paper will comply with ethical principles after Frank writes the relevant declaration of interest or disclosure statement.	5
3. Yes, he should accept the co-authorship as there are no problems with the ethics of publication.	0
4. No. There are several ethical problems due to undeclared financial interests, poor analysis, failure to give appropriate credit to citizen scientists and other contributors and/or co-authors, inclusion of the citizen scientists' personal information without consent, etc. Mike should address these problems with the co-authors and advise them to provide all necessary declarations and references as well as to obtain consent or delete all sensitive personal information about citizen scientists.	10
5. Yes, but only if the co-authors delete the citizen scientists' names and photos from the paper.	5

Feedback

The lack of references to the project, to the participants who collected data, and to their contributions is unethical. The contributions of the CS project's participants and the paper's co-authors must be properly declared in the declaration of interest or disclosure statement.

Although Frank is Mike's friend, his involvement in the CS project is quite normal. However, involving an unskilled young student in the processing and analysis of the gathered data may create unjustified results. Moreover, Frank's financial interest in the NGO Healthy Nutrition in which his uncle Robert is also involved raises ethical questions about Frank's results, which are expected to be published jointly.

In CS projects, it is important to make ethical decisions about which of the participants to take on as co-authors of the paper. Anyone who has contributed to the project can be a co-author of the paper. However, some ethical questions arise from the lack of any reference to Frank's role in this study.

The presence of multiple unethical conditions as well as undeclared conflicts of interest should alert Mike. Of course, each of them can be properly declared and resolved in the paper. However, considering the totality of the emerging ethical issues, it is advisable for Mike to give up the dubious pleasure of being a co-author of such a publication.

Developed by Volodymyr Sherstiuk and Maryna Zharikova