EU-CIRCLE

A pan-European framework for strengthening Critical Infrastructure resilience to climate change

D6.11: Case Study 5 : Evaluation report

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Statement

EU-CIRCLE advances the state-of-the art through a general risk assessment framework that can be used to examine the risk of damage to critical infrastructure under the increasing stress of climate change and associated climate hazards. The holistic approach considers also secondary impacts as consequences of critical infrastructure disruptions. EU-CIRCLE tested and demonstrated this approach in several case-studies. This report presents the agenda of the final workshop of the case-study Dresden/Germany, concrete results from applying the EU-CIRCLE CIRP tools and reports on the end-user feedback.

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	Name	Partner	Date
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Executive Summary

Critical Infrastructure (CI) play a vital role in modern communities. Destruction or failure of critical infrastructure can disrupt the smooth functioning of society, with negative impacts on our ability to continue in our daily activities; well-being; and security. Climate related hazards (e.g. floods, storms, extreme precipitation, wildfires etc.) have the potential to destroy or substantially disrupt the effective operation of European CI. With projected climate change, the frequency and intensity of climate related hazards will likely increase impacting even further on critical infrastructures and its services.

EU-CIRCLE conducts five case studies with the objective to test the modelling environment CIRP (Critical Infrastructure Resilience Platform) that has been developed within the EU-CIRCLE project.

One of the case-studies has been conducted in the region Dresden/Germany. The focus was on the eastern part of Dresden. This area has been repeatedly flooded and infrastructures damaged and disrupted. A special problem is the dependency of the sewage system from the electrical grid. A major effort of the case-study was to model the electrical grid, the sewage network system and the critical dependencies with the help of CIRP and to estimate impacts for different scenario combinations related to: adaptation measures, different climate hazard scenarios and population forecasts.

The report provides first an overview of the international workshop held as the final point of the case-study “Flooding in Dresden/Germany”. Contributors were participants in the EU-CIRCLE project, local and regional stakeholders, operators of critical infrastructures, representatives from administrations and scientists related to resilience.

Secondly, this deliverable summarises the analytical results from the case-study for the various scenarios. The impacts of two adaptation strategies are compared.

Thirdly the report presents the evaluation results. Workshop participants and especially the critical infrastructure operators draw a positive feedback from the case-study, the EU-CIRCLE methodology and tools and the case-study modelling results.

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Abbreviations

CI	Critical Infrastructure
CIRP	Critical Infrastructure Resilience Platform
Dx.y	Deliverable
Tx.y	Task
WP	Work package

Contents

1 Introduction

Critical Infrastructure (in the following referred to as CI) play a vital role in modern communities. Destruction or failure of critical infrastructure can disrupt the smooth functioning of society, with negative impacts on our ability to continue in our daily activities; well-being; and security. Climate related hazards (e.g. floods, storms, extreme precipitation, wildfires etc.) have the potential to destroy or substantially disrupt the effective operation of CI. With projected climate change, the frequency and intensity of climate related hazards will likely increase impacting even further on critical infrastructures and its services.

EU-CIRCLE developed a generic and holistic framework (WP 3, WP 4) to test and evaluate the resilience of critical infrastructures against climate hazards which can also be applied to evaluate adaptation strategies. Furthermore, the project developed a modelling environment to operationalise the approach and facilitate systematic evaluations (WP 5). The project tested and demonstrated this approach in several case-studies (WP 6), among them one in Dresden/Germany related to flooding of infrastructures.

As a final event of this case-study, the EU-CIRCLE consortium conducted an international workshop dedicated to demonstrating and discussing the results of the case-study.

This report describes in the following chapter the workshop and its agenda. In chapter 3, the results of applying the EU-CIRCLE methodology are presented. Chapter 4 summarises the results of the evaluation process that has been conducted during the workshop. In chapter 5, exemplary screenshots showing social media posts about the workshop are provided.

2 Workshop

2.1 Venue

The workshop took place in the premises of Fraunhofer IVI, Zeunerstraße 38, in the institutes main conference room. For the interactive session, another meeting room (Room. 230) was also used. This room was equipped with additional monitors to display and demonstrate various technologies related to infrastructure resilience. The space in front of the two rooms and inbetween was used for poster presentations and for catering during breaks.

2.2 Agenda

One day before the workshop, the EU-CIRCLE partners met at Fraunhofer IVI and did a rehearsal of all project internal presentations. The international workshop itself took place on August 29th, 2018 and discussed the following topics:
– Current achievements of project EU-CIRCLE
– Presentation of modelling tools developed in EU-CIRCLE with a focus on CIRP and flood visualisation tools
– Results from the case study in Dresden and reports from other case-studies
– Local and regional approaches to improve climate change resilience
– Presentation of further projects in the area of resilience research and discussion of potential synergies.

The interactive demonstration session took place in parallel to lunch. The following table presents the live-demos shown during this phase, the names of the responsible person, their institutional and project affiliation.

Table 1. Overview of interactive live-demos

EU-CIRCLE - CIRP Overall system and Dresden case study tools	*Antonis Kostaridis* *Stefan Hahmann*	Satways Fraunhofer IVI	EU-CIRCLE
EU-CIRCLE - Flood visualisation	*Mike Gibson*	University of Exeter	EU-CIRCLE
INGE - Interactive hazard map for flood management	*Katrin Hänsel*	State Office for Environment, Agriculture and Geology	STRIMA II
HAZUR® ASSESSMENT city resilience assessment	*Ignasi Fontanals*	OPTICITS	RESCCUE
Coupling of 3D city models and hydro-numeric models	*Torsten Heyer*	TU Dresden, Hydraulic Engineering	FloRiCiMo
Web based tools on urban adaptation and climate risk topology	*Peter Bosch*	TNO	RESIN

The final phase of the workshop was group discussions with the following topics:

- Modelling aspects: moderated ba y Mike Gibson and Antonis Kostaridis
- Stakeholder engagement, incl. training: moderated by Ralf Hedel, Dave Stewart, George Eftychidis
- Urban climate change resilience challenges: moderated by Louisa Shakou

- Climate Change Adaptation – Decision making under uncertainty: moderated by Jean Lecroart, Thanasis Sfetsos

The workshop included a social program, which facilitated networking and exchange of knowledge between participants. This included a social dinner in the city (the day before the workshop) and a boat tour to reach the case-study area in the east of Dresden. On the day after the workshop, the EU-CIRCLE conducted a technical meeting. In the following, the agenda of the actual workshop day, 28th August 2018 is presented.

Table 2. Agenda of workshop

Part A: Overview of EU-CIRCLE		
9:30 – 9:40	Opening, welcome & agenda	Thanasis Sfetsos (NCSRD), Ralf Hedel (IVI)
9:40 – 10:10	Introduction to EU-CIRCLE project and case studies	Thanasis Sfetsos (NCSRD), Jean Lecroart (Artelia), Dave Stewart (Torbay Council), Fuad Ali (USAL)
10:10 – 10:25	Introduction to EU-CIRCLE CIRP and flood visualization techniques	Antonis Kostaridis (SWTS), Mike Gibson (UNEXE)

Part B: Dresden – Introduction to case study		
10:25 – 10:45	Case study Dresden – Objectives, methodology, threats and area	Ralf Hedel (IVI)
10:45 – 11:15 Group photo & Coffee break		

Part C: Case study Dresden results		
11:15 – 11:45	Case study Dresden – Tools and results	Stefan Hahmann (IVI)
11:45 – 12:00	Heavy rain risk management in Central Europe – Insights from Saxony	Florian Kerl (Saxon State Ministry for Environment, Agriculture and Geology)

12:00 – 12:05	Introduction to evaluation questionnaires	Ilias Gkotsis (KEMEA)
12:05 – 12:15	Introduction to interactive demonstrations	Ralf Hedel (IVI)
12:15 – 13:45 Light Lunch **Interactive Session – Live demo of tools and technologies**		

Part D: Research dissemination		
13:45 – 15:30	Presentations on key findings from resilience-related research	RESCCUE, RESIN BRIGAID, DAREnet, STRIMA II, M&S RUE and FloRiCiMo
15:30-16:00 Coffee Break		

Part E: Discussion and closing Session		
16:00 - 16:45	Discussion in groups on four topics: - Modelling issues - Stakeholder engagement, training - Urban climate change resilience challenges - Climate change adaptation under uncertainty Joint distillation of key aspects.	Moderation in Groups: Louisa Shakou, Thanasis Sfetsos, Antonis Kostaridis, Jean Lecroart, Dave Stewart, George Eftychidis, Mike Gibson
16:45 – 17:00	Closing remarks, presentation of key findings from group discussion	Thanasis Sfetsos, Ralf Hedel, Group leaders
17:00	Transfer to Hotel Pullman by Fraunhofer's electric bus	

Social Event	
18:00	Meeting at entrance of Hotel Pullman, Walk to "Terrassenufer"
19:00-21:30	Boat tour to Dresden case study area, Social dinner on board

During the workshop, the public relation team of Fraunhofer IVI took several photos. A small selection is presented in the figure below.

Figure 1: Impressions from the different phases of the workshop

Welcome and introduction by Dr. R. Hedel and Dr. T. Sfetsos

Details on the case-study presented by Dr. S. Hahmann

Dr. F. Kerl from Saxon Ministry explains climate challanges in the case-study region

Discussions during the interactive session in Rm.230

Discussions during the interactive session

Group discussion on the topic “Stakeholder engagement“

2.3 List of participants

Invited participants to the workshop included local and regional stakeholders related to flood protection, disaster relief, operators of critical infrastructures, representatives from administrations (City of Dresden, State ministries, neighboring counties) and scientists related to resilience research.

The list below lists the workshop participants (Wednesday, August 29, 2018). The original list with the signatures of the participants is archived in the Fraunhofer IVI administration.

Table 3. Listing of workshop participants

Ali, Fuad	USAL - University of Salford
Anderssohn, Frank	MRK
Anzaldua, Gerardo	Ecologic
Babeniuk, Ganna	Fraunhofer IVI
Backhaus, Lars	TU Dresden - Hydraulic Engineering
Bosch, Peter	TNO
Bousis, Vasilios	HNMS - Hellenic National Meteorological Service
Brausewetter, Patrick	Fraunhofer IVI
Cesarec, Ivana	DUZS - National Protection and Rescue Directorate Croatia
David, Walter	Ronin Institute
Diagourtas, Dimitris	Satways
Duce, Elenia	RINA-C
Eftychidis, George	KEMEA - Center of Security Studies
Facco, Lorenzo	RINA-C
Fontanals, Ignasi	OptiCits
Freissinet, Catherine	ARTELIA
Frenzel, Frank	City of Dresden - Environmental department
Fritsche, Gerold	SE DD - Stadtentwässerung Dresden
Gibson, Mike	UNEXE - University of Exeter
Gkotsis, Ilias	KEMEA- Center of Security Studies
Güttler, Ivan	DHMZ - Croatian Meteorological and Hydrological Service
Habermann, Nadine	Fraunhofer IVI
Hahmann, Stefan	Fraunhofer IVI
Hänsel, Katrin	LfULG - Saxon Flood Forecasting Centre / Saxon State Office for Environment, Agriculture and Geology
Hedel, Ralf	Fraunhofer IVI
Hentschke, Stefan	County Bautzen- Department for fire and civil protection
Heyer, Torsten	TU Dresden - Hydraulic Engineering
Holcinger, Nataša	DUZS - National Protection and Rescue Directorate Croatia
Illing, Christian	THW Headquarter
Ingirige, Bingu	HUD - University of Huddersfield
Kalin, Ksenija Cindrić	DHMZ - Croatian Meteorological and Hydrological Service
Karatarakis, Nikolaos	HNMS - Hellenic National Meteorological Service
Kast, Emily	Fraunhofer IVI
Kerl, Florian	LfULG - Saxon Flood Forecasting Centre / Saxon State Office for Environment, Agriculture and Geology
Kostaridis, Antonis	Satways
Küster, Andreas	MRK
Lecroart, Jean	ARTELIA
Matijaš, Maja	DUZS - National Protection and Rescue Directorate Croatia
Meier, Martin	County Bautzen - Department for fire and civil protection
Mita, Tina	HNMS - Hellenic National Meteorological Service
Neubert, Marco	IOER - Leibniz Institute of Ecological Urban and Regional Development
Olfert, Alfred	IOER - Leibniz Institute of Ecological Urban and Regional Development
Ortlepp, Regine	IOER - Leibniz Institute of Ecological Urban and Regional Development
Oßwald, Frank	County Meissen - Department for fire and civil protection
Petrović, Nenad	VVG - University of Applied Sciences Velika Gorica
Ritter-Kittelmann, Kai	County "Sächsische Schweiz-Osterzgebirge" - Department for disaster and civil protection
	German Red Cross – Saxony branch, disaster relief command post
Schinke, Reinhard	IOER - Leibniz Institute of Ecological Urban and Regional Development

Sfetsos, Thanasis	NCSRD - Demokritos
Shakou, Louisa	EUC- European University of Cyprus
Skitsas, Michael A.	ADITESS
Stewart, Dave	Torbay Council
Stranjik, Alen	VVG - University of Applied Sciences Velika Gorica
Strazza, Carlo	RINA-C
Tönjes, Stefan	MRK
Ullrich, Susann	County "Sächsische Schweiz-Osterzgebirge" - Department for disaster and civil protection
Voigt, Ronald	County Meissen - Department for fire and civil protection
Wood, Mike	Torbay Council
Zimmermann, Rocco	TU Dresden - Hydraulic Engineering

3 Results from applying the EU-CIRCLE approach

Within EU-CIRCLE, various case-study has been conducted in order to validate the developed approach. One case-study focused on the City of Dresden (Germany) and the threats from flooding situations. Dresden and the sourounding region was flooded in previous years – especially 2002 and 2013. It is expected from academia, authorities and critical infrastructure operators that (due to climate change), such extreme climate hazards will increase in terms of severity and frequency in the future. Extensive research results already exists pertaining to climate change in the Dresden region, together with simulated water depths estimations for different climate hazards. These modelling data has been adopted from local authorities and it was recommended to use these modelling results also as an input for the modelling in EU-CIRCLE.

This section presents the results from applying the assessment approach developed within EU-CIRCLE. According to the Description of Action, the full explanation of the case study region, the infrastructure, previous research, research questions and other background information is provided in Deliverable D6.10).

In the first phase of the case-study, multiple meetings and expert interviews with infrastructure operators were conducted (full information about these meetings is also provided in D6.10). During these meetings it became clear that – from the set of tools developed within EU-CIRCLE – the strongest interest is to test the modelling environment EU-CIRCLE CIRP (Critical Infrastructure Resilience Platform) which is capable of **analysing interdependencies in critical infrastructure**.

It was decided to test the modelling platform for a large test area - the east part of the City of Dresden. The main focus is the "behaviour" of the electrical grid and the sewage grid under extreme climate hazard situations.

The city administration itself already have conducted detailed simulations on flood hazards and were able to provide water depths estimations for specific flood scenarios up to river levels of 10.50 m. Furthermore, the city administration also provided spatially disaggregated population forecasts. The critical infrastructure operators provided information about the network structure and about possible adaptation options. Full information about analyses, input data and assumptions are provided in the complementary deliverable D6.10. Descriptions of the plug-ins developed within CIRP can be obtained through the projects collaboration platform XWiki[1].

The following figures show the water depth raster data sets above the network of roads and the buildings (OpenStreetMap) and the administrative borders. The water depth raster data sets where used in many of the implemented analyses.

The water level of 700 cm is very important for the city of Dresden, since at this point, roads close to the river Elbe and basements of buildings are inundated. If this level is reached, "alarm level 4" will be called. Flood protection measures will be implemented and affected areas will be provided with necessary supplies.

[1] https://eu-circle.ivi.fraunhofer.de/xwiki/bin/view/CIRP/

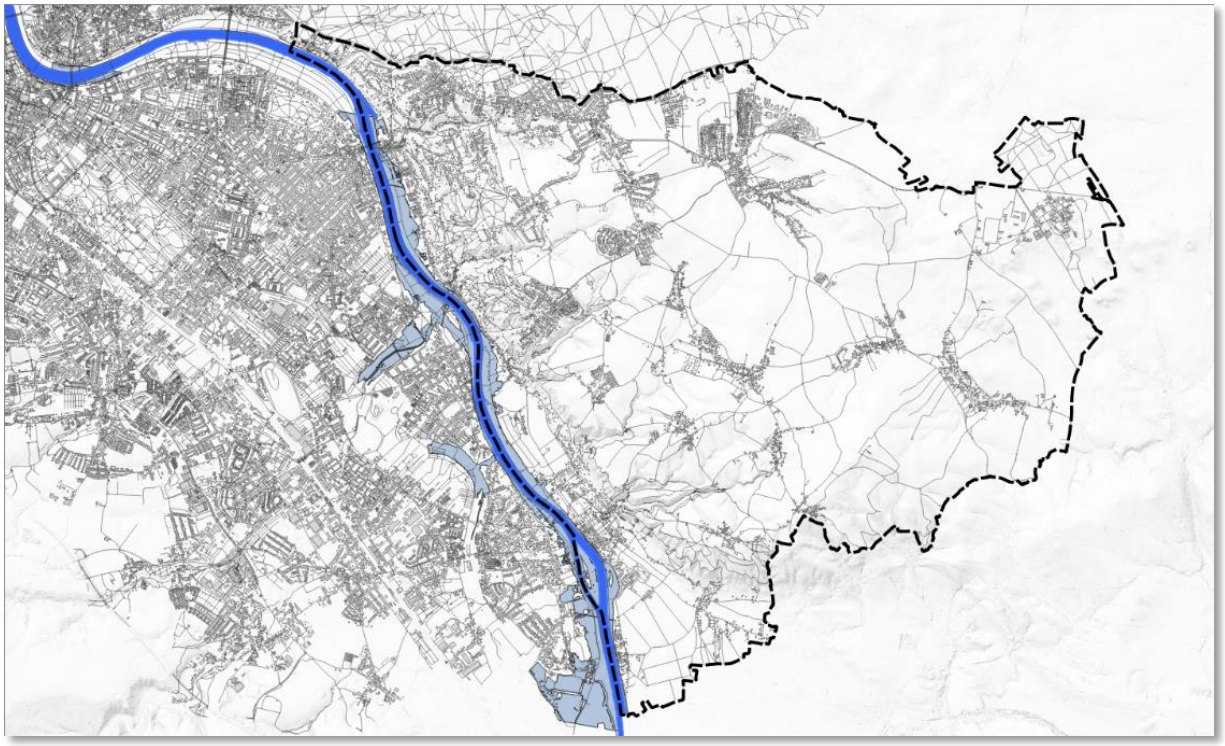


Figure 2: Inundation of case-study area with flood level 700 cm.
Data sources: City of Dresden, OpenStreetMap 2018.

The water elevation of 924 cm at level station Dresden is referred to as 100-year flooding level.

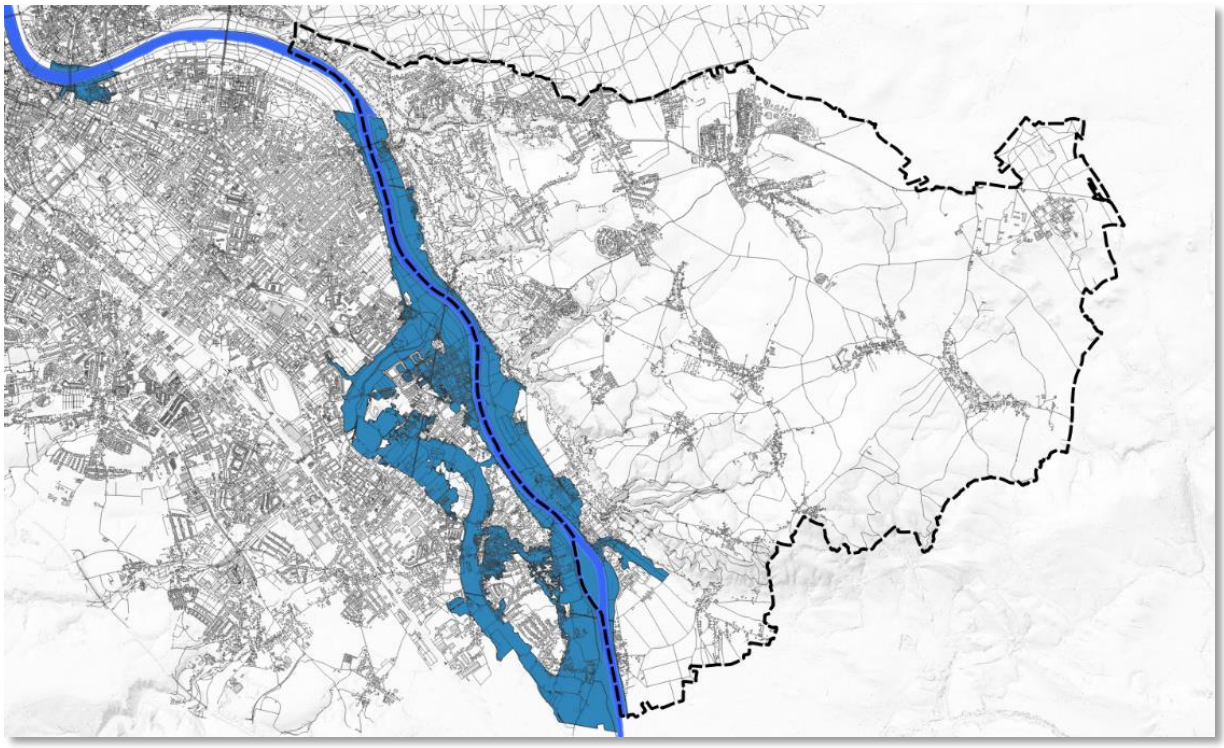


Figure 3: Inundation of case-study area with flood level 924 cm
Data sources: City of Dresden, OpenStreetMap 2018

The level of 1050 cm is referred to as the extreme, but possible case, also referred to as 500-year flooding. The city administration uses this hazard scenario in current discussions related to flood protection.

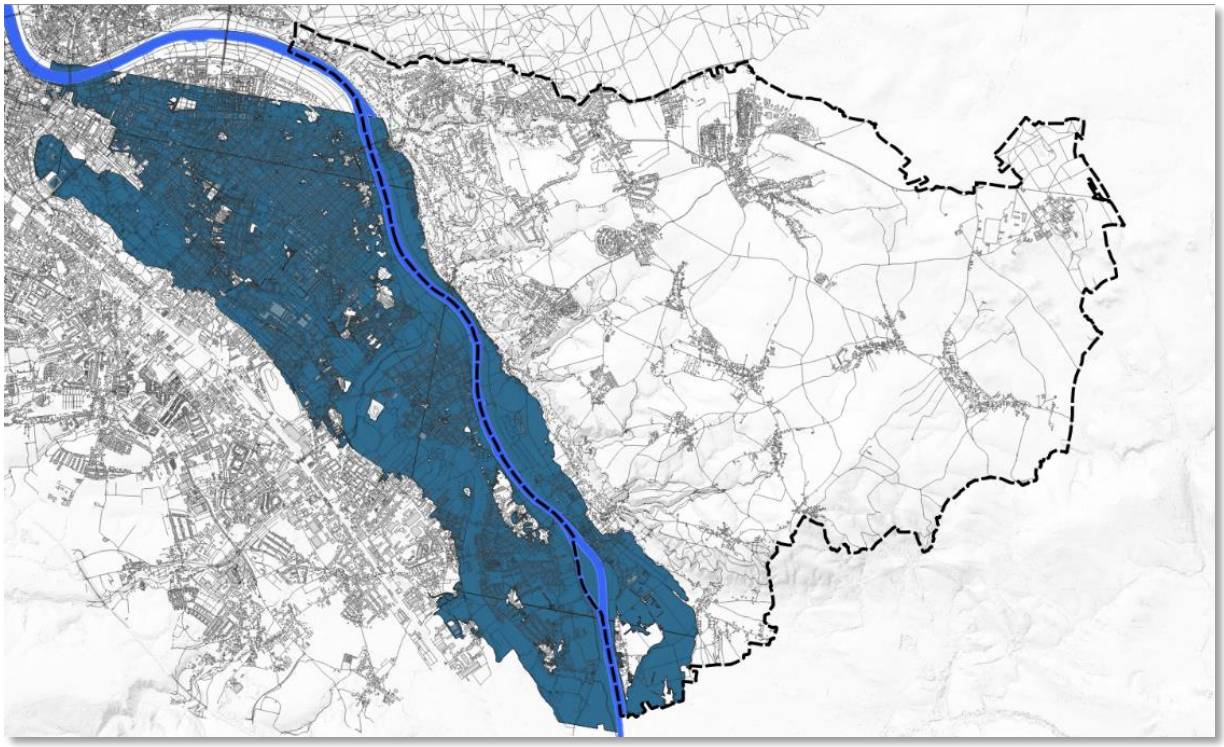


Figure 4: Inundation of case-study area with flood level 1050 cm
Data sources: City of Dresden, OpenStreetMap 2018

All results were calculated for different scenarios pertaining to different assumptions:

- with and without adaptions measures (construction of a new sewage culvert under the river Elbe, relocation of electric substation station to higher altitude position),
- three different climate hazards (flood levels) as mentioned in the chapter above and
- two demographic situations (2017 and 2025).

3.1 CIRP analysis results

The results presented in the following were calculated with the specific modules implemented for the case-study Dresden within EU-CIRCLE CIRP. Again, the analysis workflows of the modules and the input data are described in full detail in D6.10. Explanations of the analysis plug-ins are available through the XWiki of EU-CIRCLE CIRP.

In the following, the analysis results are presented with one map for each analysis for a selected scenario and an overview table with the central result figures.

3.1.1 Directly affected inhabitants

The analysis calculates the **number of inhabitants affected by flood**. It is based on population data on the level of statistical blocks for the years 2017 and 2025, the borders of the statistical blocks and on water depth raster files for the three flood scenarios. The results are shown in the following figure and table.

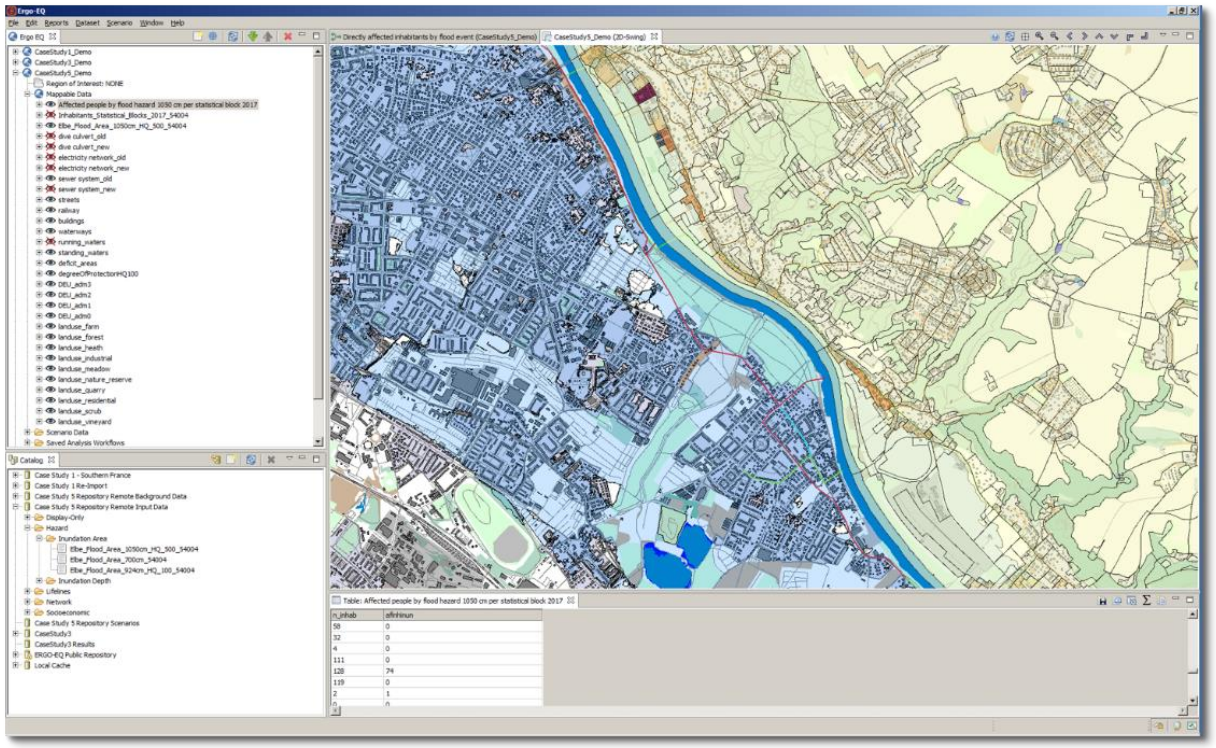


Figure 5: Red and orange surfaces show the directly affected inhabitants by flood level 1050 cm
Data sources: City of Dresden, OpenStreetMap 2018

Table 4. Number of inhabitants directly affected from flooding

	700 cm (alert level 4)	924 cm (100year flood)	1 050 cm (500year flood)
2017	59	993	1 908
2025	61	1 019	1 958

3.1.2 Directly affected electrical substations and sewage pumps

The analysis reveals, which electrical substations and **which sewage pumps are directly affected by flooding**. The user can specify the water depth on the network substations / sewage pumps that causes them to be offline and "out of order".

The analysis is based on the locations of the substations/ sewage pumps and the water depth raster data for the specific flood scenario.

All flooded substations/ sewage pumps are marked red on the map. The following figure presents the results for the scenario with flood level of 1050 cm and 20 cm acceptable flooding height.

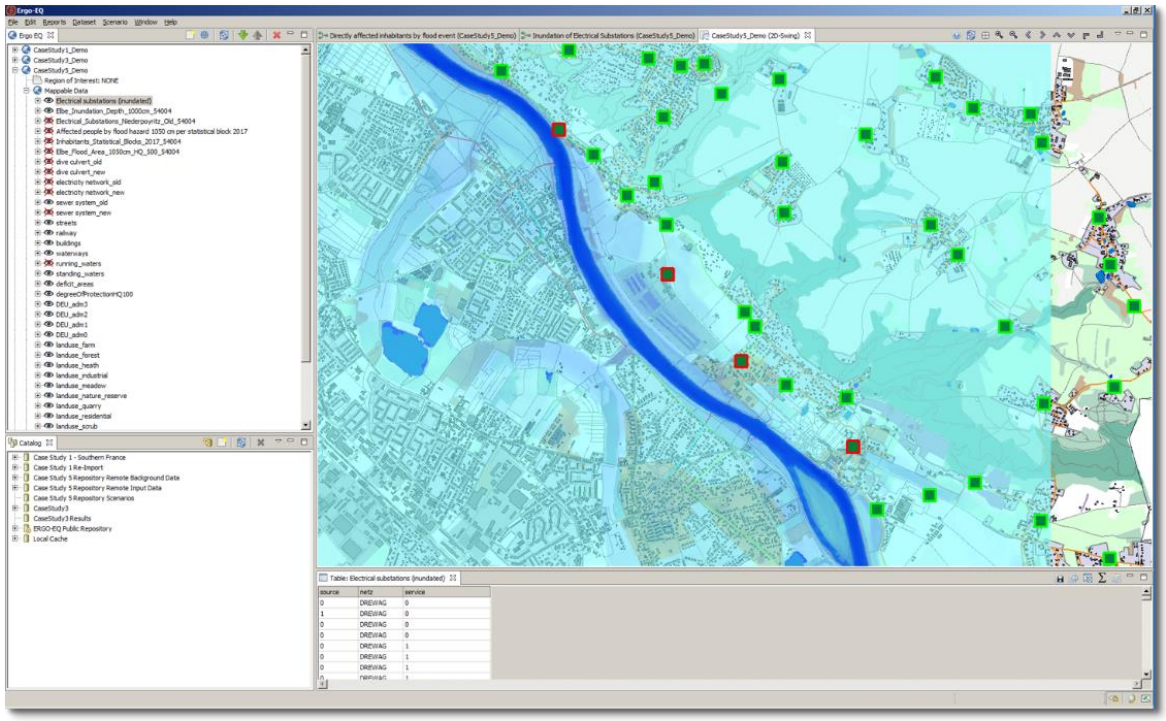


Figure 6: Red sign: directly affected electrical substations, Green sign: not affected substations. Assumptions: Flood level 1050cm, 20 cm acceptable flooding height.
Data sources: City of Dresden, OpenStreetMap, Stadtentwässerung Dresden, Drewag Netz 2018

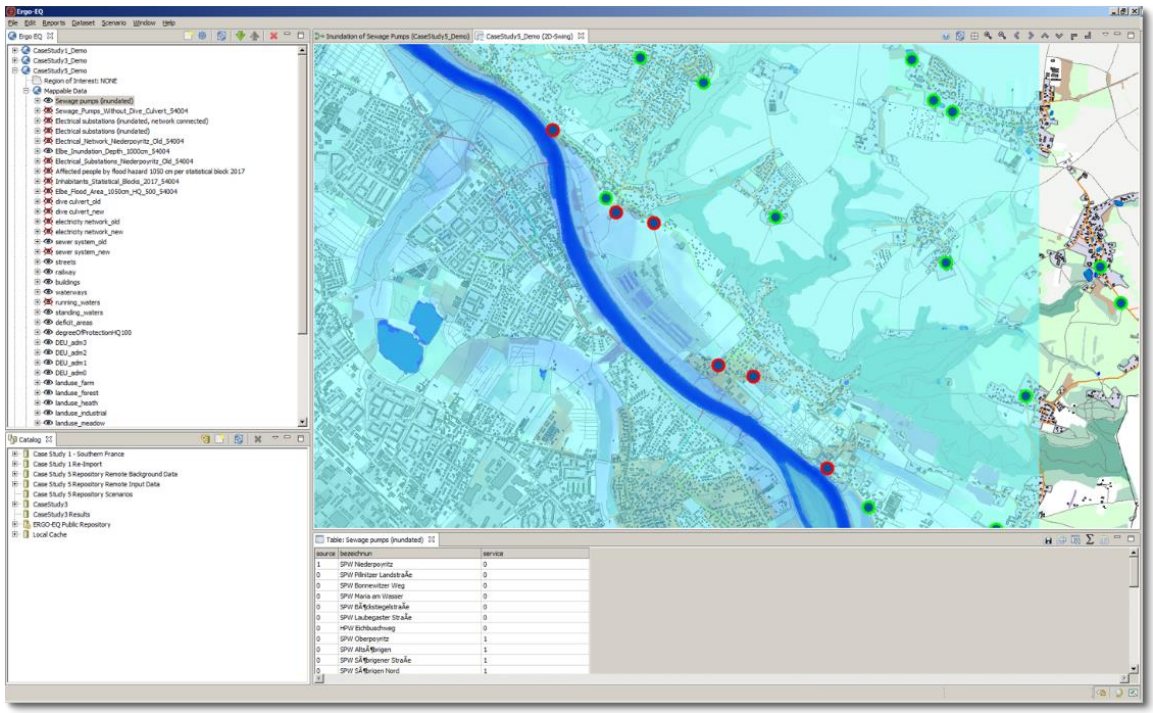


Figure 7: Red sign: directly affected sewage pumps, Green sign: not affected sewage pumps. Assumptions: Flood level 1050cm, 20 cm acceptable flooding height.

Data sources: City of Dresden, OpenStreetMap, Stadtentwässerung Dresden, Drewag Netz 2018

Table 5. Number of CI elements directly affected from inundation. For electrical substation, one additional scenario with relocation to higher altitude is calculated.

	700 cm (alert level 4)	924 cm (100 year flood)	1 050 cm (500 year flood)
Electrical substations (without adaptation)	0	1	6
Electrical substations (with adaptation)	0	0	5
Sewage pumps (with/without adaptation)	0	5	8

3.1.3 Cascading effects within the electricity network

The analysis examines the relationships **within** the energy network. **If one of the main stations fails due to flooding, other stations are affected by the failure and are not functional**. As a result, all directly and indirectly affected substations are highlighted in red and the number of "defective" stations is presented, please see next map and table.

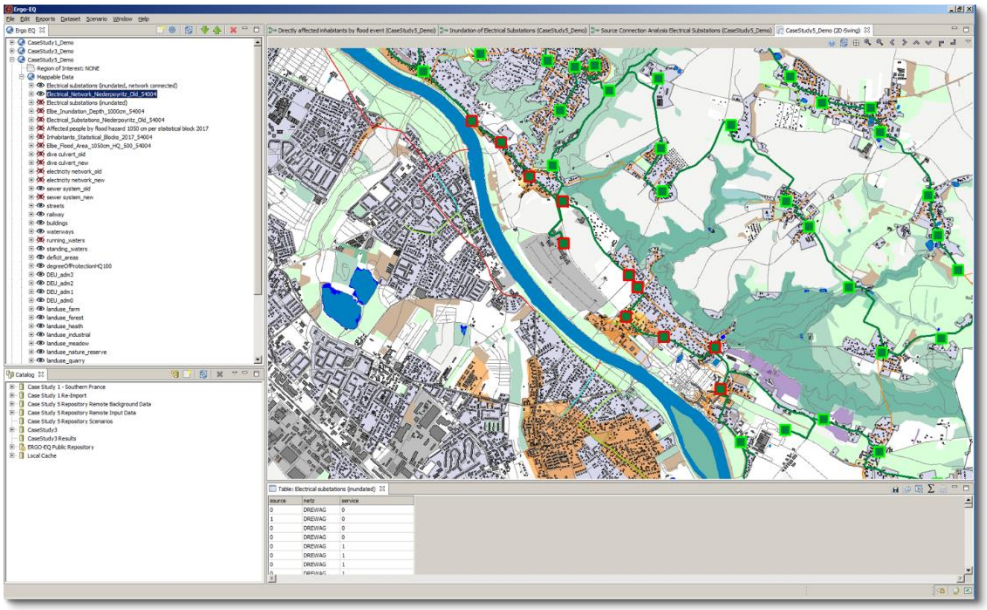


Figure 8: Red: direct and indirect affected electrical substations / Green: working electrical substations / Flood level: 1050cm (level Dresden)

Data sources: City of Dresden, OpenStreetMap, Stadtentwässerung Dresden, Drewag Netz 2018

Table 6: Number of direct and indirect affected substations. For electrical substation, one additional scenario with relocation to higher altitude is calculated.

	700 cm (alert level 4)	924 cm (100 year flood)	1 050 cm (500 year flood)
Affected Substations (Without Adaption measures)	0	1	13
Affected Substations (With Adaption measures)	0	0	10

3.1.4 Interdependency between critical infrastructures

This analysis examines, **which sewage pumps** are not directly influenced by the flood, but are **connected to one of the offline electrical substations and are therefore out of order**. The sewage pumps identified in red are no longer functional either by direct flooding or by lack of energy.

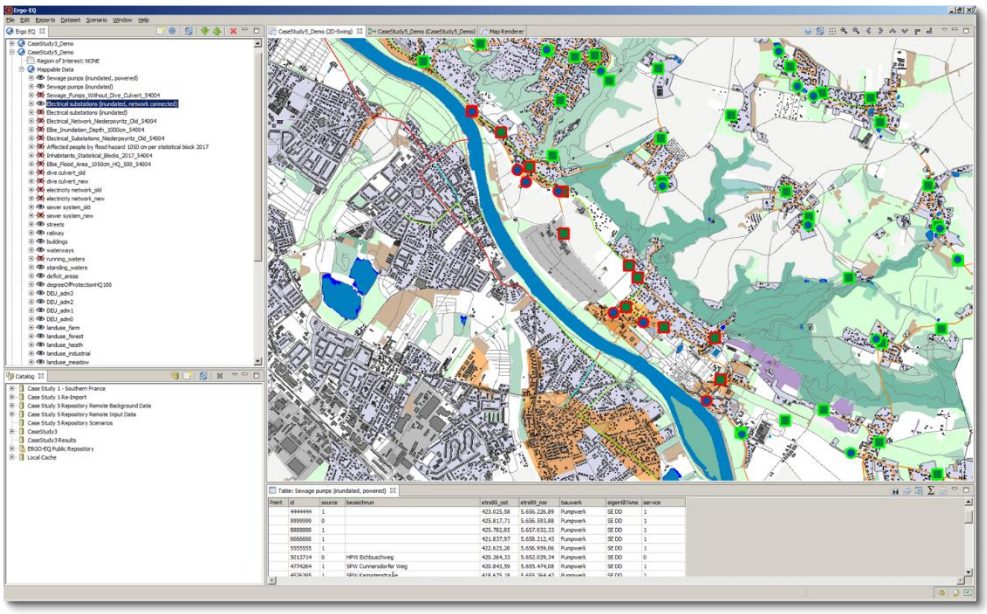


Figure 9: Red: substations and sewage pumps offline due to interdependencies between the CI; Green: online substations and sewage pumps; flood level: 1050cm

Data sources: City of Dresden, OpenStreetMap, Stadtentwässerung Dresden, Drewag Netz 2018

Table 7: Number of defective sewage pumps due lack of power. Two different scenarios: with and without adaptation in the sewage network (new culvert tube).

	700 cm (alert level 4)	924 cm (100 year flood)	1 050 cm (500 year flood)
Offline Sewage Pumps (Without adaptation)	0	5	9
Offline Sewage Pumps (With adaptation)	0	5	8

3.1.5 Cascading effects within the sewer network

The basis of this analysis is the network of active sewage pumps. All pumps that are not directly affected by the flooding and the responsible network station are considered to be working.

However, sewage pumps which are out of order due to flooding affect those which are still working upstream. The water begins to accumulate in the sewer network which can lead to severe damage through backwater. This will cause other pumps to fail.

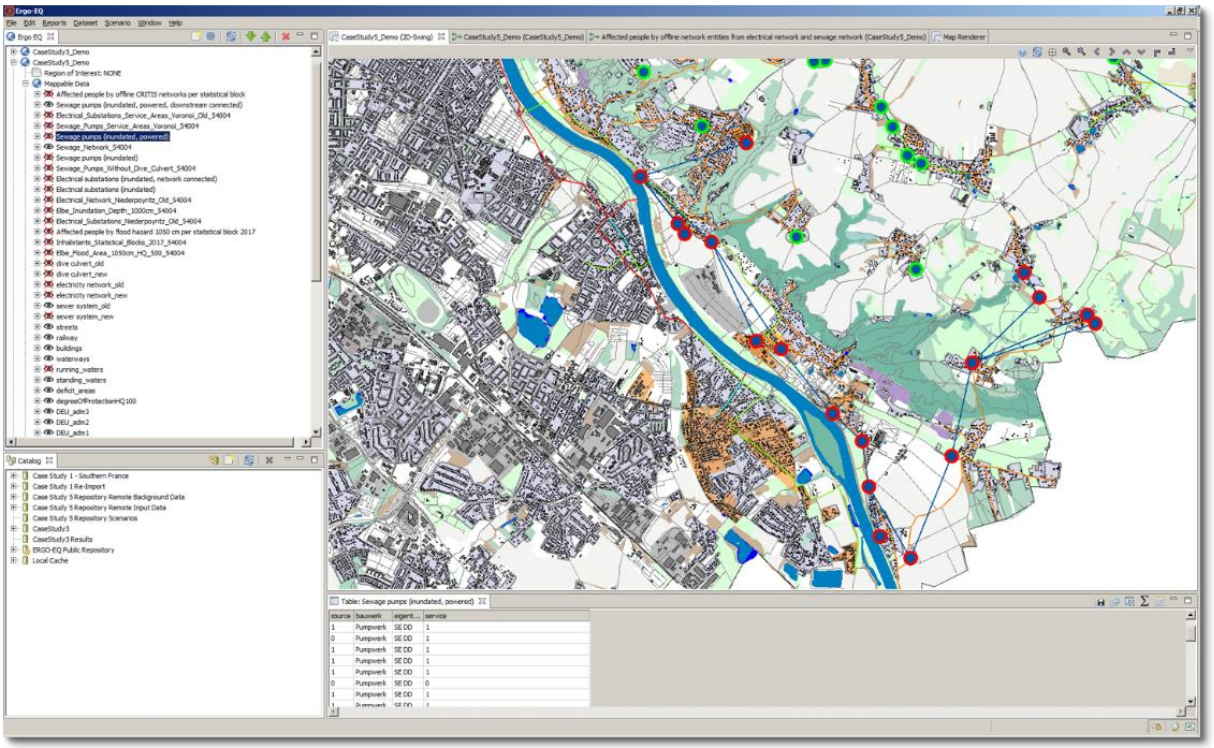


Figure 10: Red: direct and indirect affected sewage pumps including pumps with lost downstream connection / Green: working sewage pumps / Flood level: 1050cm.

Data sources: City of Dresden, OpenStreetMap, Stadtentwässerung Dresden, Drewag Netz 2018

Table 8: Number of offline sewage pumps due to direct effect of flood, cascading effects within the CI and pumps with lost downstream connection. With and without adaptations in the CI network.

	700 cm (alert level 4)	924 cm (100 year flood)	1 050 cm (500 year flood)
Affected Sewage Pumps (Without Adaptation)	0	**18**	**18**
Affected Sewage Pumps (With Adaptation)	0	**16**	**17**

3.1.6 Inhabitants affected by offline CI elements

The analysis provides the number of inhabitants **indirectly affected by the flood, that is, by the loss of electricity and sewage**. The areas associated with substations / sewage pumps and the number of inhabitants in the form of statistical blocks serve as input. The result reflects the proportion of the area of a statistical block in this service sector. All areas affected by loss of service are highlighted in red.

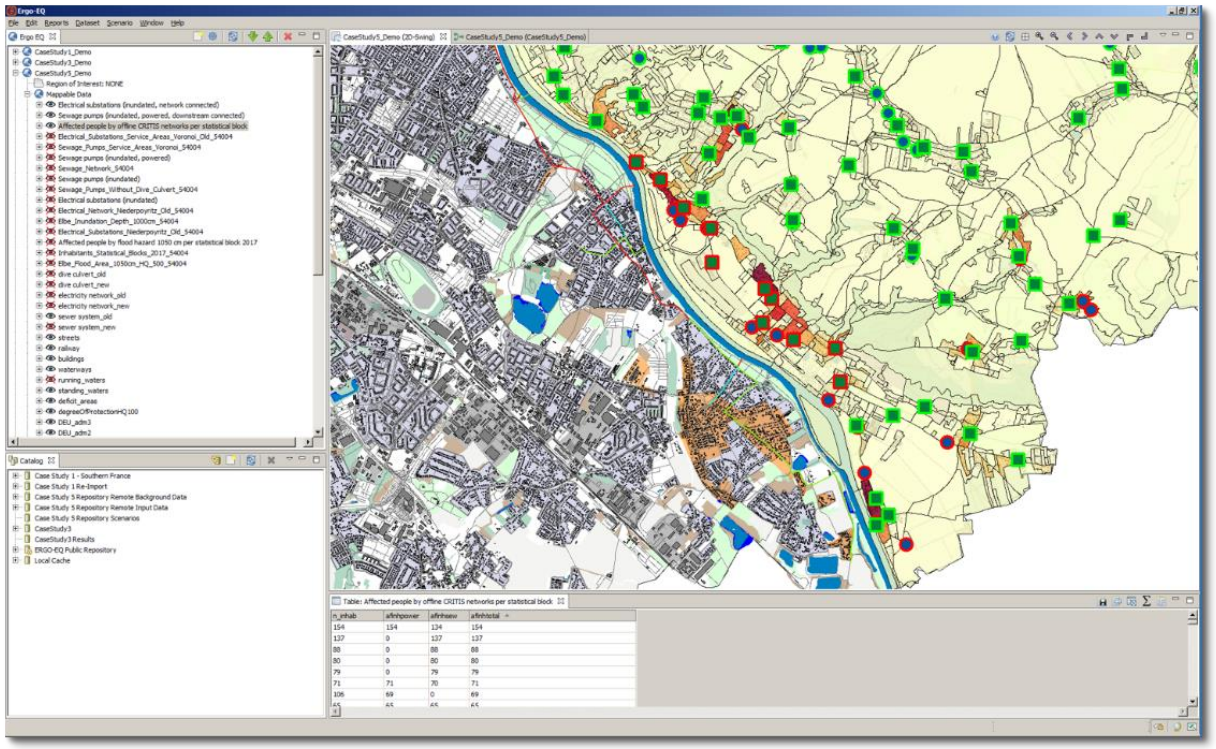


Figure 11: Red and orange surfaces show indirect affected inhabitants due to loss of electricity / Flood level: 1050cm.

Data sources: City of Dresden, OpenStreetMap, Stadtentwässerung Dresden, Drewag Netz 2018

Table 9: Number of inhabitants indirect affected by flood due to cascading effects within the CI network. Without adaptations within the CI network.

	700 cm (alert level 4)	924 cm (100 year flood)	1 050 cm (500 year flood)
People without Sewage	0	5 537	5 537
People without Electricity	0	156	2 931
Total	0	5 537	6 153

Table 10: Number of inhabitants indirect affected by flood due to cascading effects within the CI network. With adaptations of the CI network.

	700 cm (alert level 4)	924 cm (100 year flood)	1 050 cm (500 year flood)
People without Sewage	0	4 773	5 085
People without Electricity	0	0	2 334
Total	0	4 773	5 702

3.1.7 Loss of revenue for CI providers

The analysis shows the indirect economic impact of a flood on the electricity supplier. The direct impact (e.g. the repair costs for individual substations) are not included in this analysis. As a result, the affected areas of responsibility of the defective substations are issued, as well as the resulting loss for the provider.

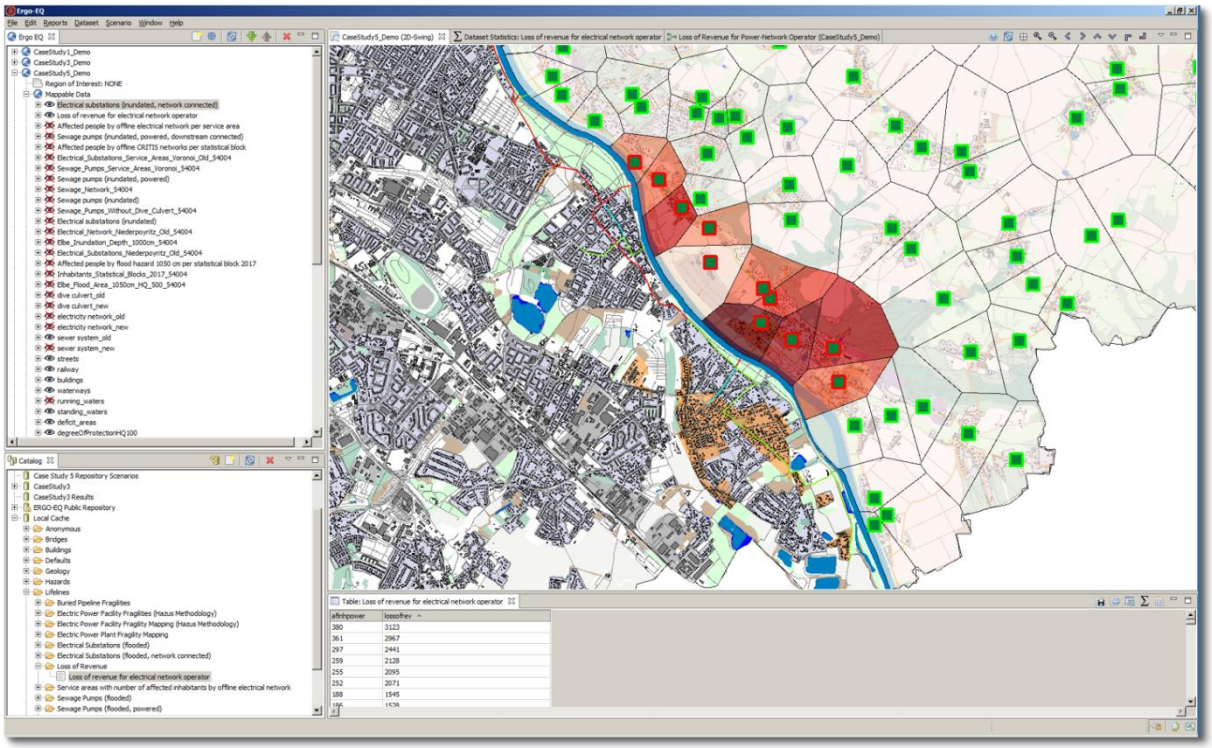


Figure 12: Red surfaces show areas without electrical service.
Data sources: City of Dresden, OpenStreetMap, Stadtentwässerung Dresden, Drewag Netz 2018

Table 11: Loss of revenue for CI provider (electricity) depending on non served people. With and without adaptations within the CI network.

	700cm (alert level 4) (5 days)	924cm (100year flood) (10 days)	1 050cm (500year flood) (15 days)
Non-served People **Loss of Revenue (Without Adaptation)**	**0** **0€**	**158** **865€**	**2 947** **24 216€**
Non-served People **Loss of Revenue (With Adaptation)**	**0** **0€**	**0** **0€**	**2 346** **19 278€**

4 Evaluation

Despite the enormous interest especially from administrations and researchers to participate in the case-study workshop, not all critical infrastructure providers from the region were able to attend due to date conflicts. Therefore, it has been decided to conduct two additional telephone interviews with critical infrastructure operators before the workshop. These interviews were conducted in the week before the workshop with the two most important case-study stakeholders: Drewag Netz (Electrical grid operator) and SE DD (Sewage network). The modelling results were sent to both interviewees prior to the telephone call. During the telephone conversation, all slides pertaining to modelling assumptions and modelling results were presented, discussed and questions were answered. The result in both cases was very positive: SEDD and Drewag Netz confirmed the plausibility of the assumptions and the compliance of the modelling results with their expectations.

Within the case-study workshop, an in-depth evaluation has been conducted. After finishing the introductive sessions regarding the EU-CIRCLE solution (specific hazard related CI network analysis) and CIRP, participants were asked to fill in a questionnaire and were also given the opportunity to express their opinion and possible suggestions. This technique allows the collection of conscious cognitive reactions and recommendations. However, all user evaluations must consider that users frequently tend to react adversely and insecure to new solutions, and that the sample is limited and focused to the specific scenario and test case, affecting the confidence levels. For the purpose of EU-CIRCLE evaluation, the following two questionnaires had been prepared, distributed to the participants, filled and collected for further analysis:

1. System Usability Scale Questionnaire (Annex I)
2. End-User Test Trial Questionnaire (Annex II)

Due to the low sample size, quantitative statistics that are presented are only indicative. Instead, the results are discussed primarily in a qualitative way. The quantitative statistics are presented in the annexes.

4.1 Feedback to the system usability scale questionnaire

In the following we present the results extracted from the System Usability Scale Questionnaire - Questionnaire 1- (as presented in Annex I) that was given after the workshop to all participants. This questionnaire consisted of ten questions and participants were asked to reply according to a five-point Likert scale, ranging from “strongly disagree” to “strongly agree”. Its aim was to evaluate the usability of the software solution.

Based on Question I.1 “I think that I would like to use this system frequently”, most of the participants (75% agreed and 25% strongly agreed) mentioned that they would like to use this system frequently. Half of them mentioned that the software was easy to use (Question I.3 “I thought the system was easy to use”), with a 25% of them reporting that they “Neither agree, neither disagree” with it. In similar lines, half of the participants indicated that most people would learn to use this system very quickly (Question I.7. I would imagine that most people would learn to use this system very quickly). In addition to this, attendants reported that they did not find the system very cumbersome to use (Question I.8 “I found the system very cumbersome to use”) and 75% reported that it is not unnecessarily complex.

System’s functions have been generally evaluated positively, with 75% of the participants finding the various functions of this system well integrated. Moreover, half of them reported that there was

not too much inconsistency in this system (Question I.6), with a 25% of them saying that they "Neither agree, neither disagree" with it. In addition, 50% of the respondents said that they did not need to learn a lot of things before getting going with the system and 25% were neutral to this.

Despite the positive attitude towards system use and the positive evaluation of its functions, only some of the attendants felt very confident using the system (25%) and half of them were neutral to system use (Question I.9. I felt very confident using the system). This finding has been highlighted in the normative literature, where it is mentioned that participants' confidence might actually decrease as they realise that they know less than the other participants during a workshop or they discover that there is much more to a particular field than they first realised.

One important insight was that participants believe that they might need the support of a technical person to be able to use this system, as 50% mentioned that they "Neither agree, neither disagree" and 25% mentioned that they "Disagree" with Question I.4. "I think that I would need the support of a technical person to be able to use this system".

To sum up, users were positive to use the system frequently, as they did not characterize it as complex and found it easy, consistent and its functions to be well integrated. However, half of the respondents were very confident using the system and 50% of them believe that they might need the support of a technical person to be able to use this system. In general terms, most of them imagine that most people would learn to use this system very quickly.
In general, while the findings show that users perceive the system positively, areas for improvement mainly related to users' confidence and system adoption and use have been highlighted. The latter can get improved through support that can be either technical or individual (probably provided through training courses).

4.2 Feedback to the end-user test trial questionnaire

In the following section we present the results extracted from the End-User Test Trial Questionnaire - Questionnaire 2- (as presented in Annex II) that was given after the workshop to the end-users. This questionnaire consisted of four main sections:

- General information
- EU-CIRCLE framework validation - intuitiveness
- Product assessment - usability
- Business model – marketability

which are analysed in the following paragraphs.

The questionnaire consisted of forty-four questions in total. Thirty-three of them were close-ended, where the respondents could choose between two or more answer options and eleven were open-ended, where the respondents were encouraged to provide their own answer. We limited open-ended questions to eleven, as answers to these questions provide more depths.

EU-CIRCLE framework validation - intuitiveness
Regarding "EU-CIRCLE framework validation - intuitiveness", most of the end-users agreed that the EU-CIRCLE platform would enable them (comparing to current methods used) to:

- assess risk and define resilience more quickly (75 %),
- assess unexpected likelihood/consequences of eventual climate change incidents more accurately (50 %),
- consider multiple risk scenarios and more threats (75 %),

- understand impacts originating from secondary/cascade effects (75 %) and
- understand risk management/strengthen resilience of their CI (75 %).

Supplementary to this, most of the respondents stated that both risk and resilience estimations are very close to what they would expect.
It appears that end-users realise the advantages of the software compared to their currently used solutions, which has been reported as the most important consideration to make when considering new software.

Product assessment - usability
According to the results of investigated issues regarding Section "Product assessment and usability", the majority of the end-users reported that the software was reliable; worked the way expected and; was reasonably fast. They also reported that the use of it was a nice experience and that they did not encounter any problems.

Half of them mentioned that it was easy to learn and use and to support this, end-users also agreed that EU-CIRCLE provided clear information and used understandable/clear terminology and that the GUI was simple and intuitive. In addition, 25 % of the respondents agreed that the error-messages of the platform were quite complex and another 25 % characterized them as helpful.
Most of the end-users prefer to get support through email or internet and not through FAQ or telephone. It appears that customers increasingly leverage self-service and digital communication channels for support services, as these channels have the least amount of friction.

Finally, all end-users mentioned that their organisations have records of the assets and are interested in continuing using the software; they also mentioned that the data available are in ASCII and GIS format.

Business model - marketability
With regards to Section "Business model – marketability", 75 % of the end-users replying to the questionnaire were working in a public entity and 25 % of them to a private, with all of the entities being non-profit. Moreover, half of the entities were operating on a regionally and the rest internationally. Moreover, end-users mentioned that in their infrastructure they "risk-assess" and "estimate resilience" on a monthly basis (25 %), at a 6-month interval (25 %) and yearly (25 %).
It was encouraging the fact that all of the respondents found the EU-CIRCLE solution to be quite innovative and interesting for them, and 75 % of the end-users would recommend the EU-CIRCLE solution. On top of this, half of them would be interested to use the EU-CIRCLE solution (once commercialized) and fine-tune it to their needs. More specifically, end-users were interested in (a) having online-access to EU-CIRCLE solution, (b) installing it locally and (c) incorporating it into their network-back office systems. In addition, they were interested in using maintenance services, technical support and staff training and not interested at all in using content analysis functionality. It appears that end-users are interested in using the software solution, but their selection of functionalities should be further analysed, as it is related to the current infrastructures that their entities have.

With regards to EU-CIRCLE payment method, end-users find more convenient the one-off payment method (25 %) and the per-use fee (25 %). The answers are contradicting, and it appears that attention should be paid to the provision of the right payment method, as it is related to end-users' understanding of the software functionalities and services (maintenance, training and technical support) provided, as well as to the realization of the solutions' advantages.

Most of the end-users did not reply to the question related to the amount of money they are willing to pay, and just 25 % mentioned that they are willing to pay (for one-off) less than €2,000. This is quite logical, as the respondents were end-users and are not familiar to software pricing.

5 Online communication

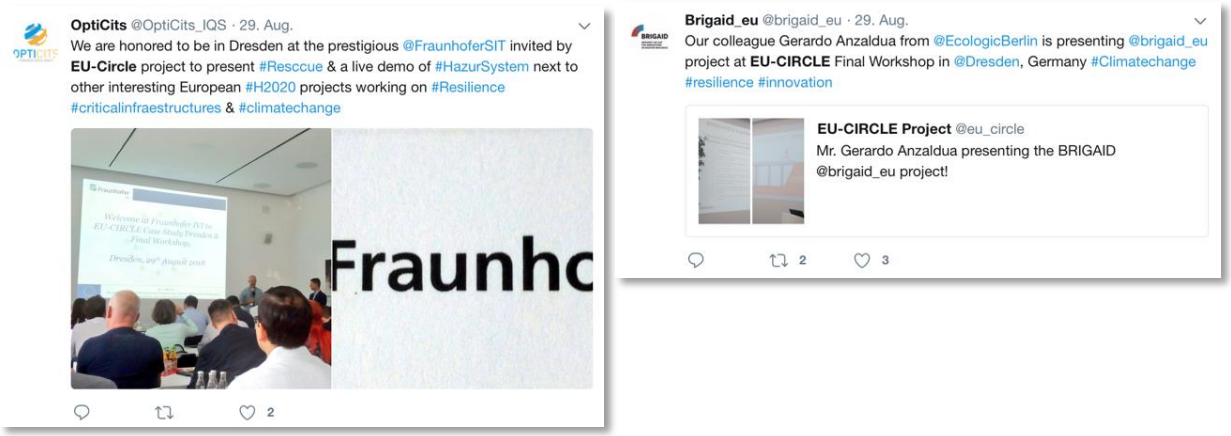
5.1 Twitter

During the workshop, participants from EU-CIRCLE project published several tweets live from the event. Selected twitter tweets are presented in the figure below.

Figure 13: Examplarly twitter tweets from the workshop form EU-CIRCLE Project

In addition, workshop participants also published some tweets at twitter, e.g. representative from the company OptiCits and from the Brigaid project. Examples are presented in the following picture.

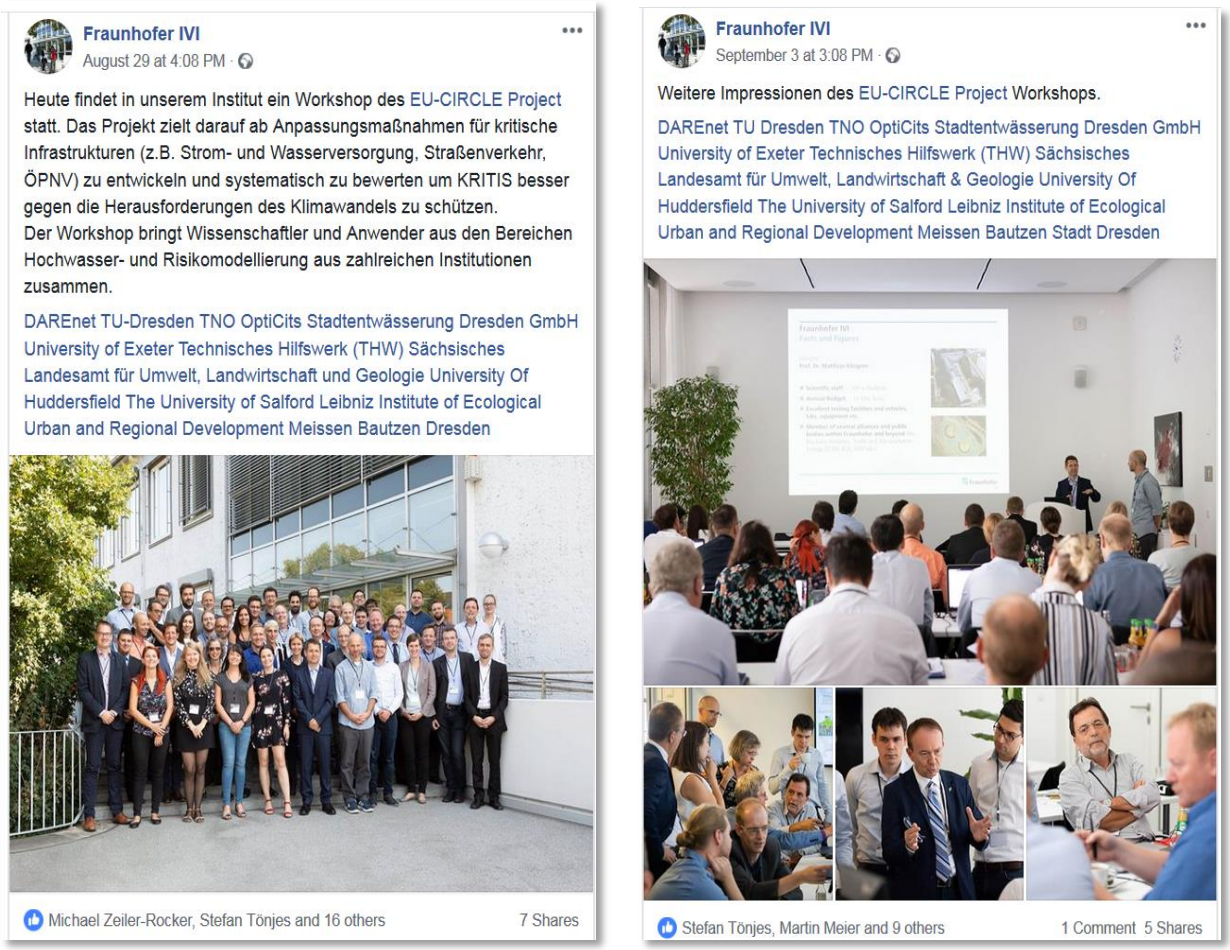
Figure 14: Examplarly twitter tweets from the external partners



5.2 Facebook

Still during the workshop, the public relation team at Fraunhofer IVI published a Facebook announcement about the workshop together with pictures. The facebook announcement also included links to the facebook accounts of workshop partners.

Figure 15: Facebook announcement



6 Annexes

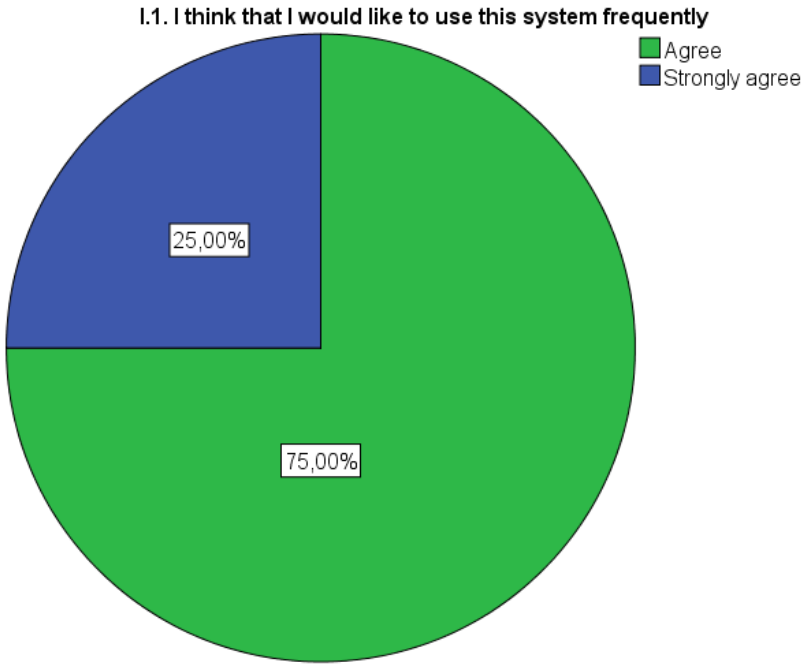
6.1 Annex Ia - System usability scale – questionnaire (all participants)

	Strongly disagree				Strongly agree
1. I would like to use this system frequently	1	2	3	4	5
2. I think the system is unnecessarily complex	1	2	3	4	5
3. I found the system was easy to use	1	2	3	4	5
4. I think that I would need the support of a technical person to be able to use this system	1	2	3	4	5
5. I found the various functions in this system well integrated	1	2	3	4	5
6. I thought there was too much inconsistency in this system	1	2	3	4	5
7. I would imagine that most people can learn to use this system very quickly	1	2	3	4	5
8. I found the system very cumbersome to use	1	2	3	4	5
9. I felt very confident using the system	1	2	3	4	5
10. I would need to learn a lot before I could get going with this system	1	2	3	4	5

6.2 ANNEX IB - SYSTEM USABILITY SCALE – QUANTITATIVE STATISTICS

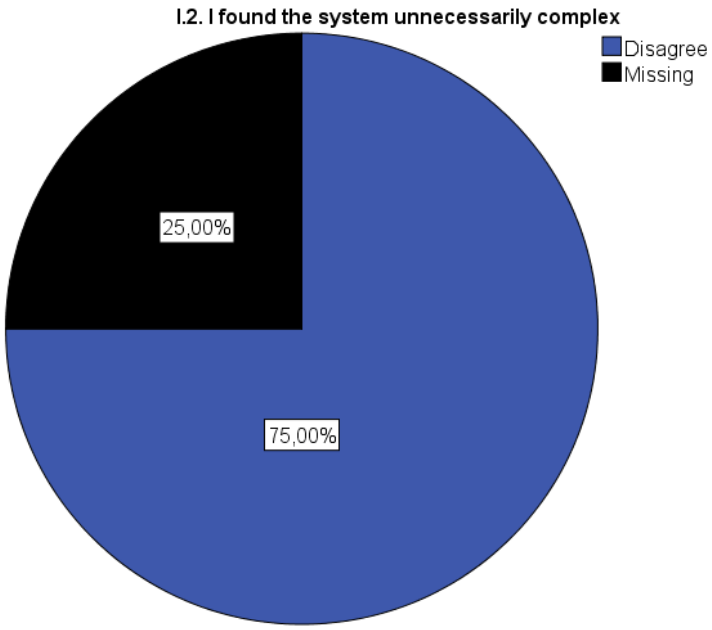
I.1. I think that I would like to use this system frequently

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	3	75,0	75,0	75,0
	Strongly agree	1	25,0	25,0	100,0
	Total	4	100,0	100,0	



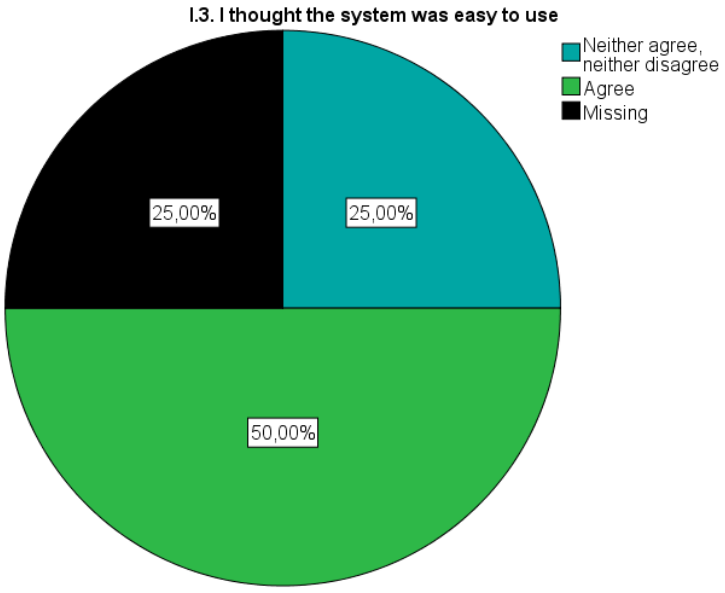
I.2. I found the system unnecessarily complex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	75,0	100,0	100,0
Missing	System	1	25,0		
Total		4	100,0		



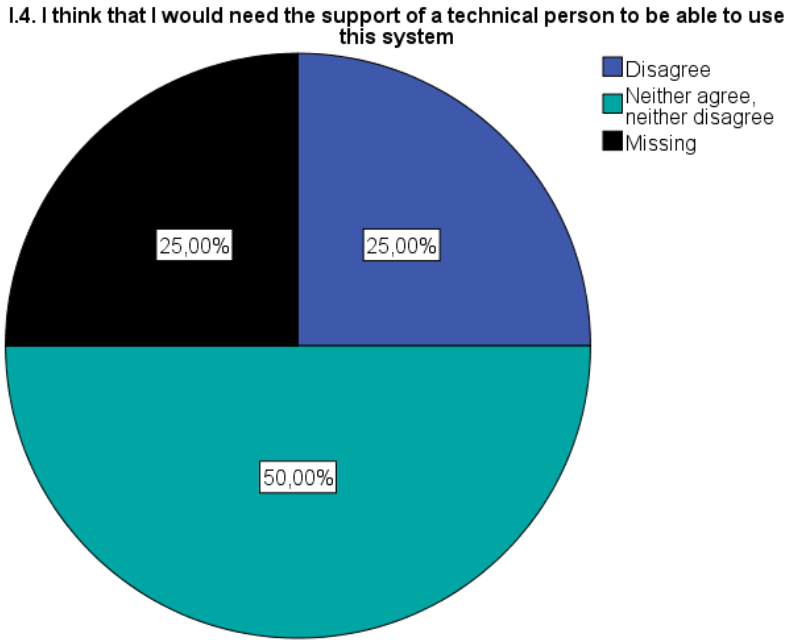
I.3. I thought the system was easy to use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neither agree, neither disagree	1	25,0	33,3	33,3
	Agree	2	50,0	66,7	100,0
	Total	3	75,0	100,0	
Missing	System	1	25,0		
Total		4	100,0		



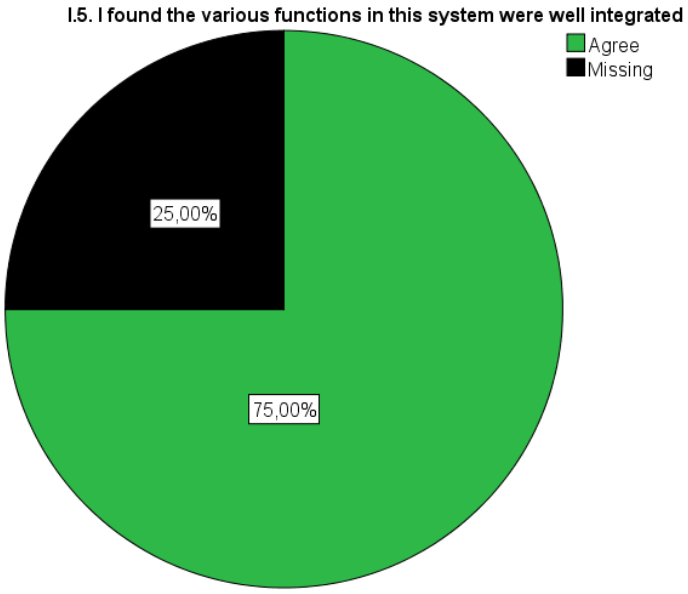
I.4. I think that I would need the support of a technical person to be able to use this system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	25,0	33,3	33,3
	Neither agree, neither disagree	2	50,0	66,7	100,0
	Total	3	75,0	100,0	
Missing	System	1	25,0		
Total		4	100,0		



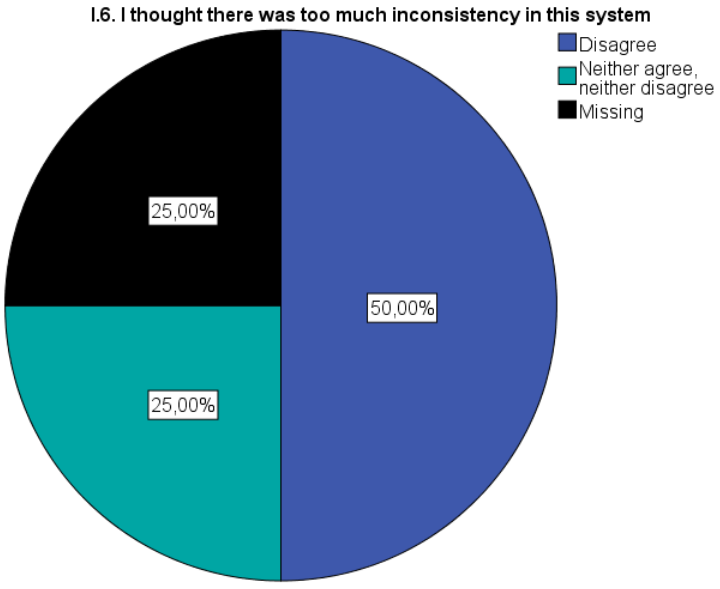
I.5. I found the various functions in this system were well integrated

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	3	75,0	100,0	100,0
Missing	System	1	25,0		
Total		4	100,0		



I.6. I thought there was too much inconsistency in this system

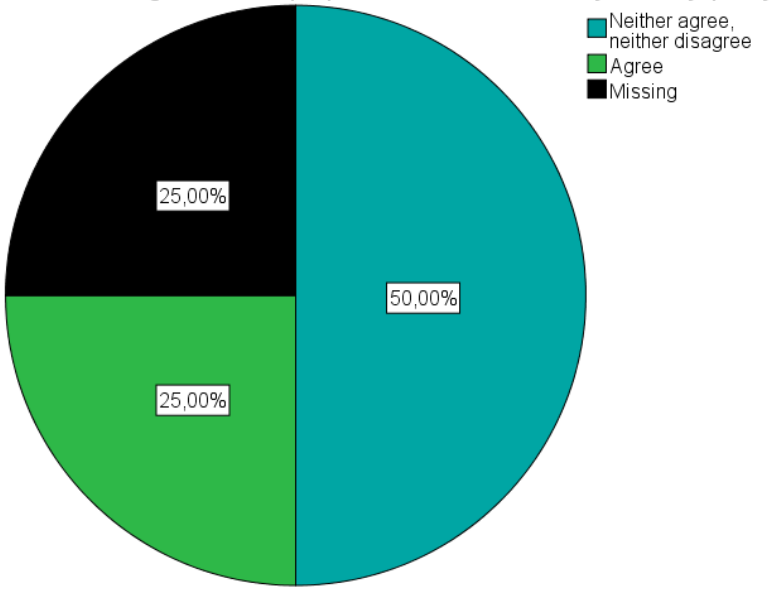
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	50,0	66,7	66,7
	Neither agree, neither disagree	1	25,0	33,3	100,0
	Total	3	75,0	100,0	
Missing	System	1	25,0		
Total		4	100,0		



I.7. I would imagine that most people would learn to use this system very quickly

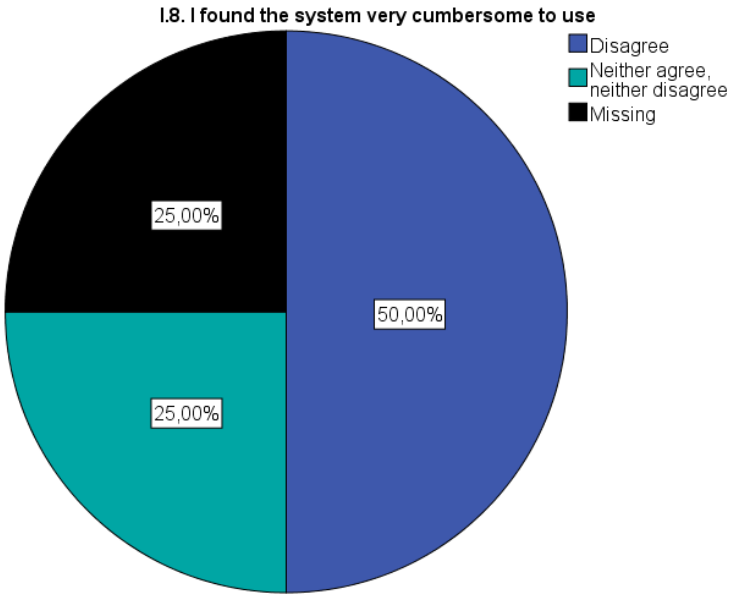
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neither agree, neither disagree	1	25,0	33,3	33,3
	Agree	2	50,0	66,7	100,0
	Total	3	75,0	100,0	
Missing	System	1	25,0		
Total		4	100,0		

I.7. I would imagine that most people would learn to use this system very quickly



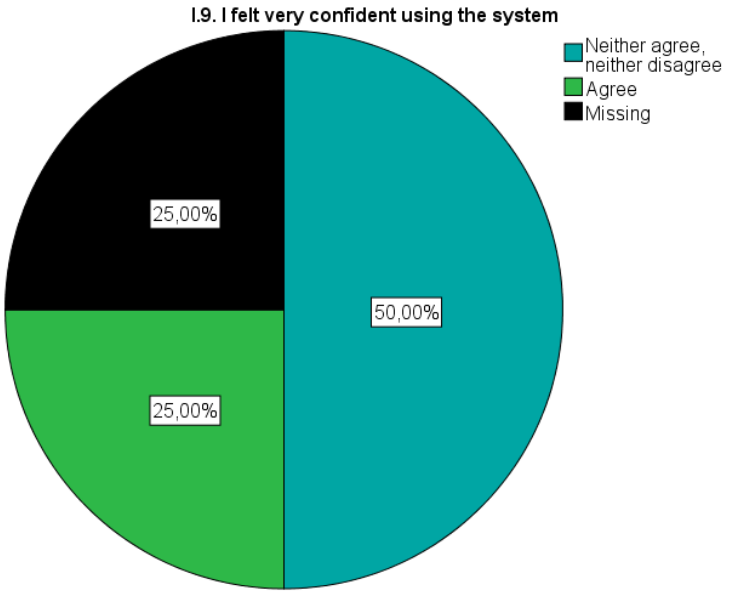
I.8. I found the system very cumbersome to use

		Frequency	Percent	Valid Percent	Cumulative Percent
	Disagree	2	50,0	66,7	66,7
Valid	Neither agree, neither disagree	1	25,0	33,3	100,0
	Total	3	75,0	100,0	
Missing	System	1	25,0		
Total		4	100,0		



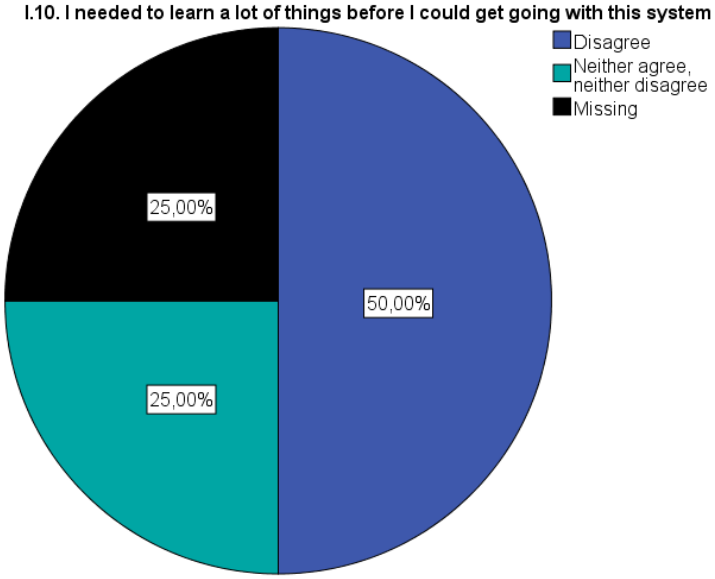
I.9. I felt very confident using the system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neither agree, neither disagree	2	50,0	66,7	66,7
	Agree	1	25,0	33,3	100,0
	Total	3	75,0	100,0	
Missing	System	1	25,0		
Total		4	100,0		



I.10. I needed to learn a lot of things before I could get going with this system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	50,0	66,7	66,7
	Neither agree, neither disagree	1	25,0	33,3	100,0
	Total	3	75,0	100,0	
Missing	System	1	25,0		
Total		4	100,0		



6.3 ANNEX IIA - END-USER TEST TRIAL – QUESTIONNAIRE (FOCUS GROUPS)

General Information

1. **Name**

2. **Contact details**

Address:	
Telephone:	
E-mail:	
Website:	

3. **Name of your company/organisation**

4. **Function/Post within company or organisation**

EU-CIRCLE Framework Validation - Intuitiveness

5. **Using the EU-CIRCLE platform would enable me to assess risks and define resilience more efficiently than with my current methods.**

(Risk)	☐Strongly agree	☐Agree	☐Disagree	☐Strongly disagree
(Resilience)	☐Strongly agree	☐Agree	☐Disagree	☐Strongly disagree

6. **If you (strongly) agree, which tasks do you think it would be completed in a better or faster way?**

Risk:

Resilience

7. **Using the EU-CIRCLE platform would enable to assess unexpected likelihood/consequences/scenarios of eventual climate/climate change driven incidents more accurately than with your current methods?**

☐Strongly agree ☐Agree ☐Disagree ☐Strongly disagree

8. **Would EU-CIRCLE solution enable you to take into account multiple risk scenarios and more threats than currently existing tools/methods allow?**

☐Strongly agree ☐Agree ☐Disagree ☐Strongly disagree

9. **Would EU-CIRCLE solution help you to understand impacts originating from secondary/cascade effects (propagated consequences)?**

☐Strongly agree ☐Agree ☐Disagree ☐Strongly disagree

10. **Would EU-CIRCLE solution enable you to plan risk management (midterm) /strengthen resilience of your CI more effectively than you can now.**

(Risk)	☐Strongly agree	☐Agree	☐Disagree	☐Strongly disagree
(Resilience)	☐Strongly agree	☐Agree	☐Disagree	☐Strongly disagree

11. **Please elaborate in which way EU-CIRCLE can achieve it (e.g. More accurate time management, better resource planning).**

12. **Do you find the EU-CIRCLE risk/resilience estimations to be very close to what I would expect, based on my experience?**

(Risk) ☐Strongly agree ☐Agree ☐Disagree ☐Strongly disagree

(Resilience) ☐Strongly agree ☐Agree ☐Disagree ☐Strongly disagree

13. **According to your opinion the overall Risk Assessment/Resilience Framework as showcased by the EU-CIRCLE consortium makes sense for mid- or long-term planning.**

(Risk) ☐Strongly agree ☐Agree ☐Disagree ☐Strongly disagree

(Resilience) ☐Strongly agree ☐Agree ☐Disagree ☐Strongly disagree

Product Assessment – Usability

14. **The EU-CIRCLE platform (CIRP) works the way you expected it should work.**

☐Strongly agree ☐Agree ☐Disagree ☐Strongly disagree

15. **If you (strongly) disagree with the above, which components do you find problematic and why?**

16. **Working with the EU-CIRCLE platform can provide you with increased capabilities to assess risk and improve resilience for my infrastructure?**

☐Strongly agree ☐Agree ☐Disagree ☐Strongly disagree

17. **Does your organisation find the capabilities of the EU-CIRCLE platform attractive to use them in your OSP?**

☐Yes ☐No

18. **Does your organization have data suitable for the EU-CIRCLE analyses?**

☐Yes ☐No

If yes, in what format they're available?

☐GIS ☐Google Earth ☐ASCII ☐XML ☐Other (specify):_____

19. **Do you agree that the EU-CIRCLE platform is easy to learn and to use**

☐Strongly agree ☐Agree ☐Disagree ☐Strongly disagree

20. **If you (strongly) disagree, which component(s) do you find difficult to use and why?**

21. Did you encounter problems while using the EU-CIRCLE platform?

☐Yes ☐No

22. If yes, were you able to recover from these errors easily and quickly?

☐Yes ☐No

23. In case you would be a formal user of CIRP, which kind of support do you prefer?

☐FAQ ☐E-Mail ☐Telephone-Hotline ☐Internet

24. Do you find the information provided by EU-CIRCLE platform to be:

☐Very Clear ☐Clear enough ☐A bit confusing ☐Incomprehensible

25. Do you find the terminology used in EU-CIRCLE to be (please tick all that apply):

☐Consistent ☐Understandable/Clear ☐Compliant to standard terms ☐Inconsistent

26. Do you find the error/help messages of the CIRP platform to be:

☐Helpful ☐Quite complex ☐Not really useful ☐Incomprehensible

27. How do you find the platform's user interface (please tick all that apply):

☐Well-designed/Ergonomic ☐Polished ☐Simple ☐Intuitive

28. Evaluate the responsiveness of the CIRP platform:

☐Very fast ☐Reasonably fast ☐Underwhelming ☐Too slow

29. Provide your overall estimation for the EU-CIRCLE solution:

☐Very reliable ☐Reliable enough ☐Not very reliable ☐Unreliable

30. Do you agree that the EU-CIRCLE solution can cover all levels of end-users (both technically and operationally oriented users)

☐Strongly agree ☐Agree ☐Disagree ☐Strongly disagree

31. What other information or functionality would you like to see in the EU-CIRCLE platform?

32. Do you have any further comments regarding the risk/resilience assessment method or the CIRP?

Risk: _____

_____

_____

Resilience: _____

_____

_____

Business Model - Marketability

33. Type of end-user's entity

☐Private ☐Public ☐Other (Specify: _____)

34. Entity form of business

☐Profit ☐Non-profit

35. Entity level of operation

☐Local ☐Regional ☐National ☐International

36. Entity annual turnover: _____€

37. How innovative do you find the EU-CIRCLE solution to be?

☐ It is quite innovative and interesting for me
☐ I am aware of other tools with similar functionality but this is the first time I get to use one
☐ I think the EU-CIRCLE is competitive in comparison to similar products
☐ I think the EU--CIRCLE is lacking compared to similar products

38. How often do you "risk-assess" or "estimate resilience" in your infrastructure?

Risk

☐Weekly ☐Monthly ☐At a 6-month interval
☐Yearly ☐Less than once per year

Resilience

☐Weekly ☐Monthly ☐At a 6-month interval
☐Yearly ☐Less than once per year

39. Are you willing to share your data with other entities that may use EU-CIRCLE?

☐Yes ☐No ☐Partially

Please elaborate:

_____

_____

40. Would you be interested to use the EU-CIRCLE solution (once commercialized) and fine-tune it to your specific needs?

☐Yes ☐No

41. If yes, which one of the following services would you be interested in (please tick all that apply):

☐Online access to EU-CIRCLE services
☐Local Installation
☐Incorporation of the functionality into your network/back-office systems
☐Technical support (customer model development, client networks data-entry)
☐Software maintenance
☐Content analysis
☐Staff training

42. Which form of payment would you find convenient for the EU-CIRCLE services (please number in order or convenience – from 1 "most convenient" to 4 "least convenient")?

☐One-off ☐Yearly/Monthly fee ☐Per use fee ☐Per license/user fee

43. How much would you be willing to pay to gain access to the EU-CIRCLE functionality?

		Price Range		
Service provision	One-off	☐Less than 2,000€	☐2,000€ - 4,000€	☐More than 4,000€
	Yearly fee	☐Less than 2,000€	☐2,000€ - 4,000€	☐More than 4,000€
	Per use fee	☐Less than 100€	☐100€ - 1,000€	☐More than 1,000€
	Per license/user fee	☐Less than 500€	☐500€ - 2,000€	☐More than 2,000€

44. Would you recommend the EU-CIRCLE solution?

☐Yes ☐No ☐With modifications

Please elaborate:

_____

_____

6.4 ANNEX IIB – END-USER TEST TRIAL – QUANTITATIVE STATISTICS

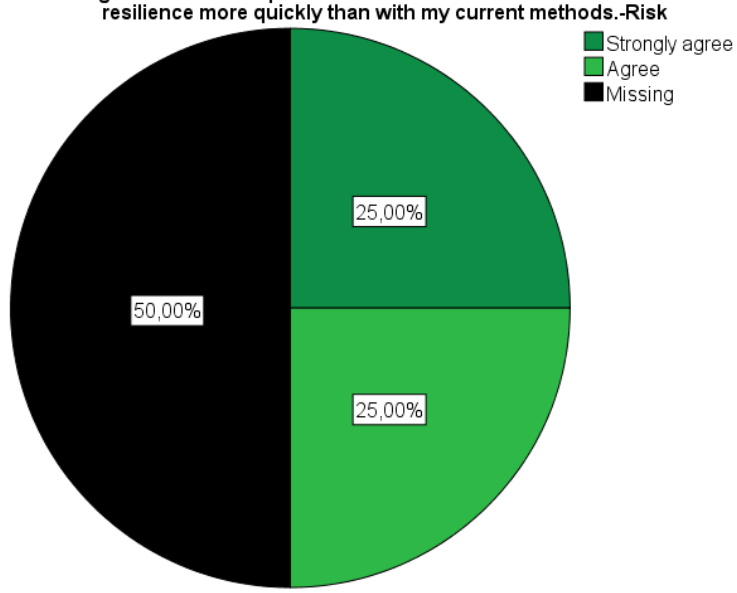
II.5.1. Using the EU-CIRCLE platform would enable me to assess risks and define resilience more quickly than with my current methods.-Risk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	25,0	50,0	50,0
	Agree	1	25,0	50,0	100,0
	Total	2	50,0	100,0	
Missing	System	2	50,0		
Total		4	100,0		

System Usability Scale Means
(Low score indicate strong average disagreement while high scores indicate strong average agreement to the responding statement)

	Mean
I.1. I think that I would like to use this system frequently	4,25
I.5. I found the various functions in this system were well integrated	4,00
I.7. I would imagine that most people would learn to use this system very quickly	3,67
I.3. I thought the system was easy to use	3,67
I.9. I felt very confident using the system	3,33
I.4. I think that I would need the support of a technical person to be able to use this system	2,67
I.6. I thought there was too much inconsistency in this system	2,33
I.8. I found the system very cumbersome to use	2,33
I.10. I needed to learn a lot of things before I could get going with this system	2,33
I.2. I found the system unnecessarily complex	2,00

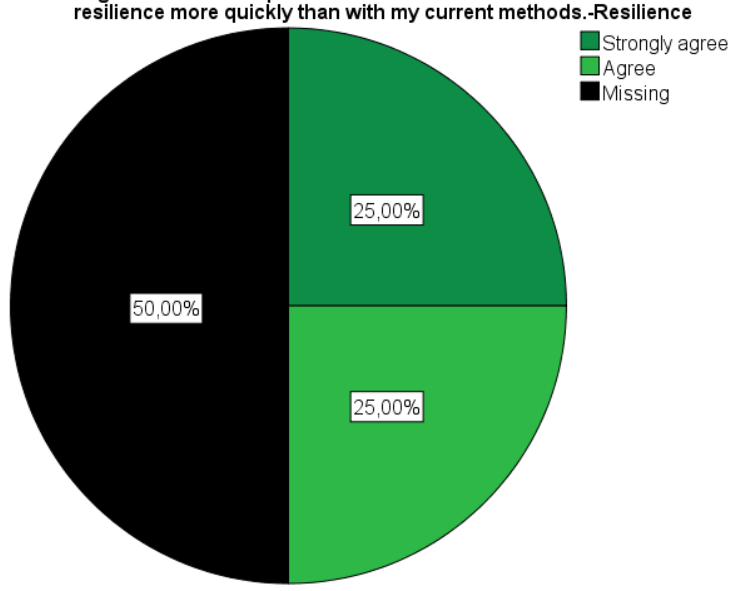
II.5.1. Using the EU-CIRCLE platform would enable me to assess risks and define resilience more quickly than with my current methods.-Risk



II.5.2. Using the EU-CIRCLE platform would enable me to assess risks and define resilience more quickly than with my current methods.-Resilience

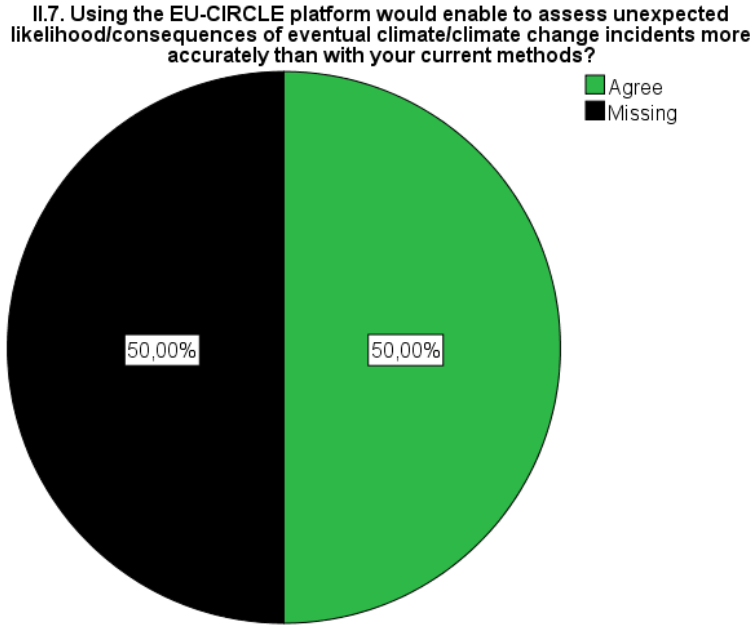
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	25,0	50,0	50,0
	Agree	1	25,0	50,0	100,0
	Total	2	50,0	100,0	
Missing	System	2	50,0		
Total		4	100,0		

II.5.2. Using the EU-CIRCLE platform would enable me to assess risks and define resilience more quickly than with my current methods.-Resilience



II.7. Using the EU-CIRCLE platform would enable to assess unexpected likelihood/consequences of eventual climate/climate change incidents more accurately than with your current methods?

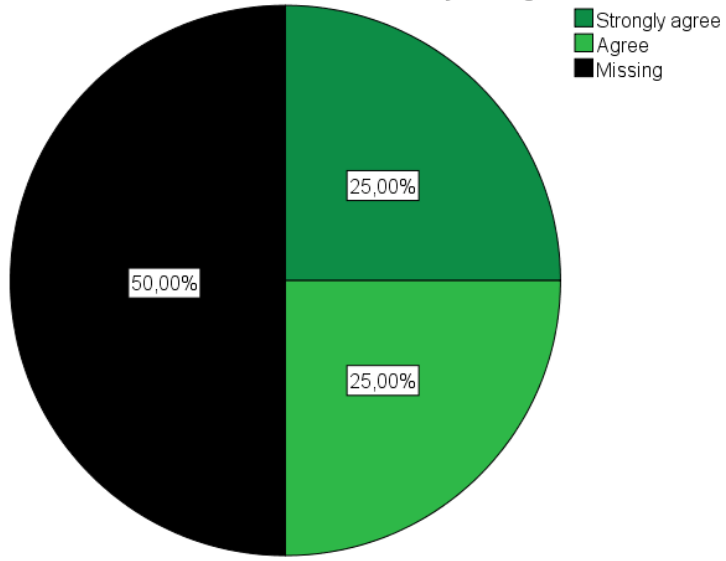
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	2	50,0	100,0	100,0
Missing	System	2	50,0		
Total		4	100,0		



8. Using the EU-CIRCLE solution would enable you to take into account multiple risk scenarios and more threats than currently existing tools/methods allow.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	25,0	50,0	50,0
	Agree	1	25,0	50,0	100,0
	Total	2	50,0	100,0	
Missing	System	2	50,0		
Total		4	100,0		

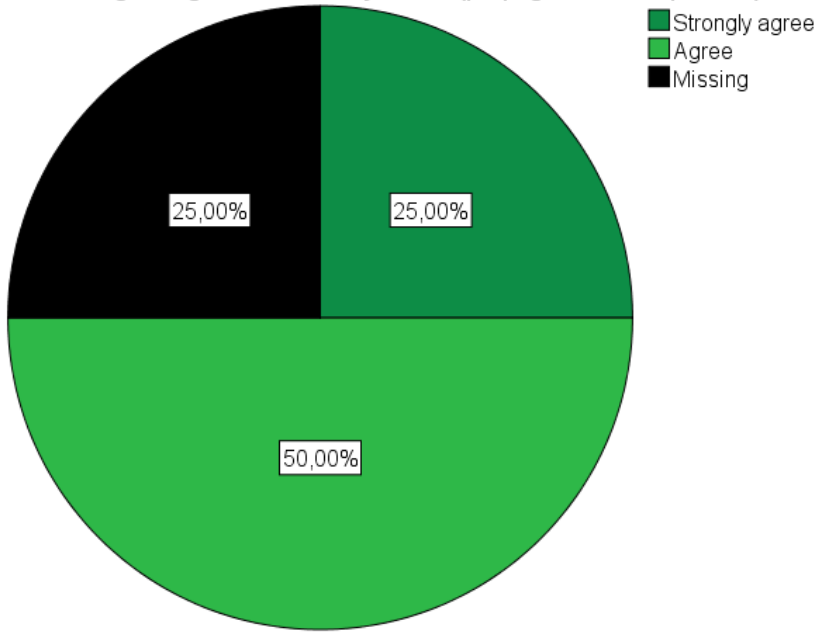
8. Using the EU-CIRCLE solution would enable you to take into account multiple risk scenarios and more threats than currently existing tools/methods allow.



9. Using the EU-CIRCLE solution would help you to understand impacts originating from secondary effects (propagated consequences).

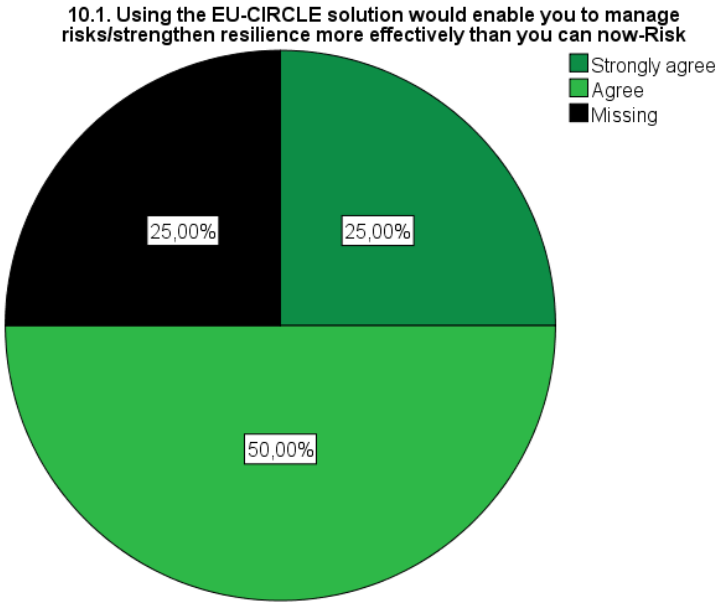
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	25,0	33,3	33,3
	Agree	2	50,0	66,7	100,0
	Total	3	75,0	100,0	
Missing	System	1	25,0		
Total		4	100,0		

9. Using the EU-CIRCLE solution would help you to understand impacts originating from secondary effects (propagated consequences).



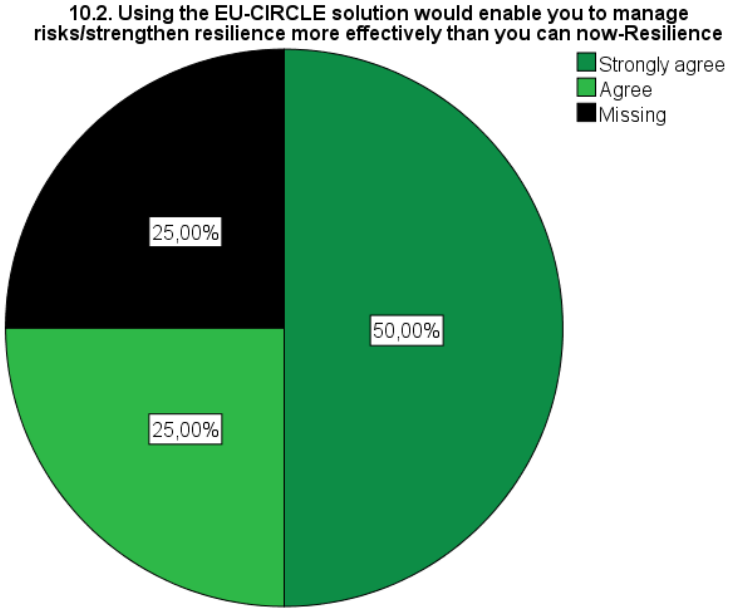
10.1. Using the EU-CIRCLE solution would enable you to manage risks/strengthen resilience more effectively than you can now-Risk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	25,0	33,3	33,3
	Agree	2	50,0	66,7	100,0
	Total	3	75,0	100,0	
Missing	System	1	25,0		
Total		4	100,0		



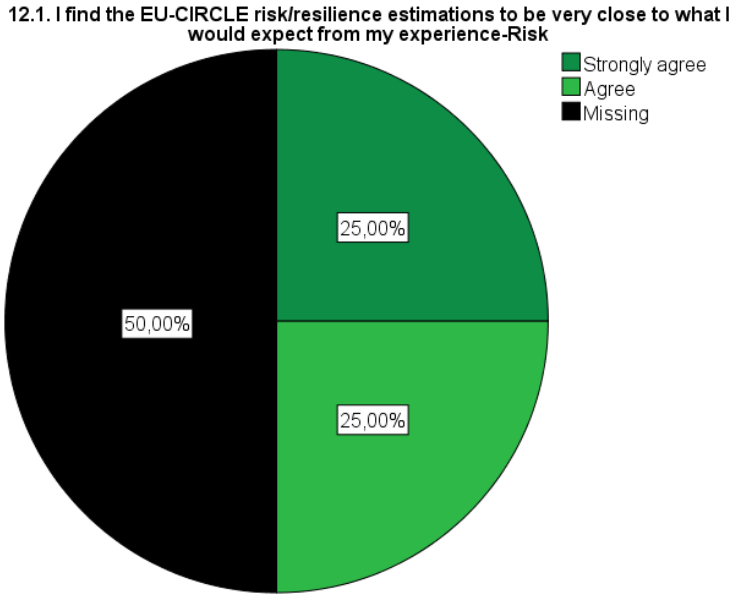
10.2. Using the EU-CIRCLE solution would enable you to manage risks/strengthen resilience more effectively than you can now-Resilience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	2	50,0	66,7	66,7
	Agree	1	25,0	33,3	100,0
	Total	3	75,0	100,0	
Missing	System	1	25,0		
Total		4	100,0		



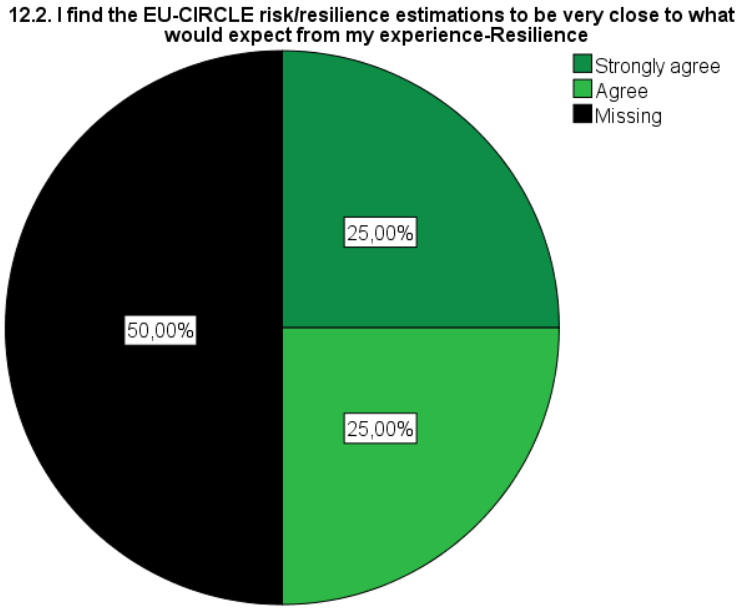
12.1. I find the EU-CIRCLE risk/resilience estimations to be very close to what I would expect from my experience-Risk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	25,0	50,0	50,0
	Agree	1	25,0	50,0	100,0
	Total	2	50,0	100,0	
Missing	System	2	50,0		
Total		4	100,0		



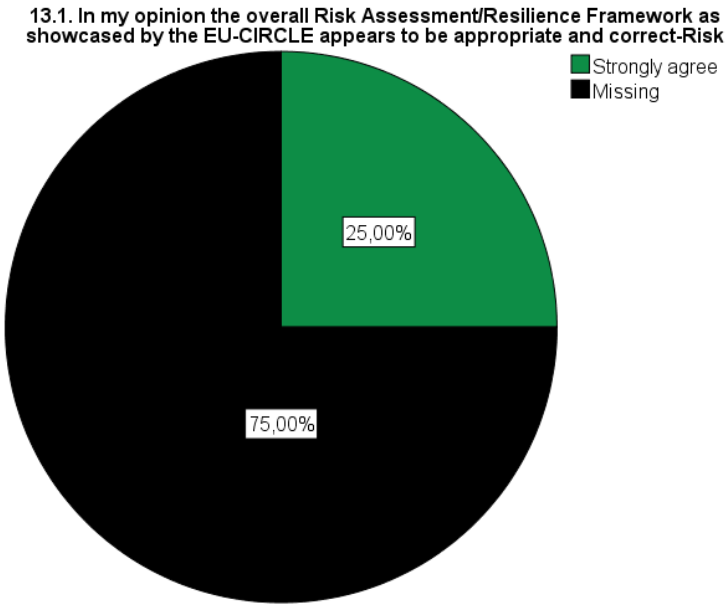
12.2. I find the EU-CIRCLE risk/resilience estimations to be very close to what I would expect from my experience-Resilience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	25,0	50,0	50,0
	Agree	1	25,0	50,0	100,0
	Total	2	50,0	100,0	
Missing	System	2	50,0		
Total		4	100,0		



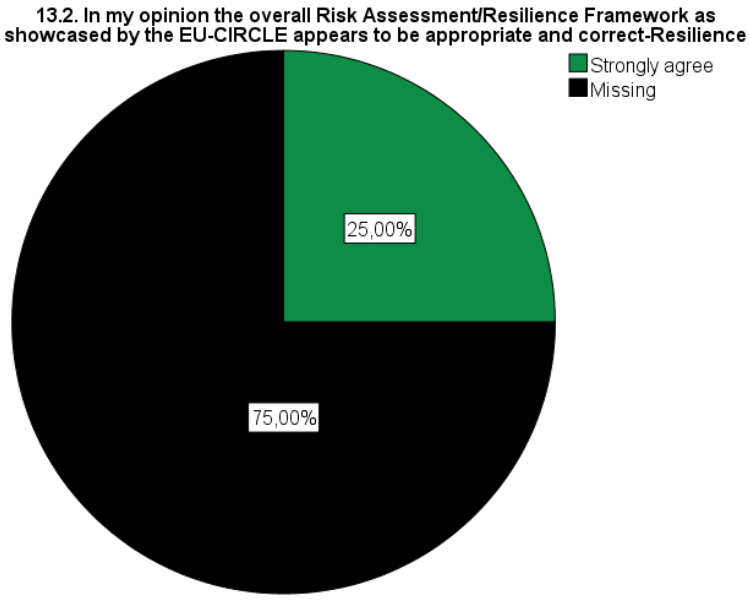
13.1. In my opinion the overall Risk Assessment/Resilience Framework as showcased by the EU-CIRCLE appears to be appropriate and correct-Risk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	25,0	100,0	100,0
Missing	System	3	75,0		
Total		4	100,0		



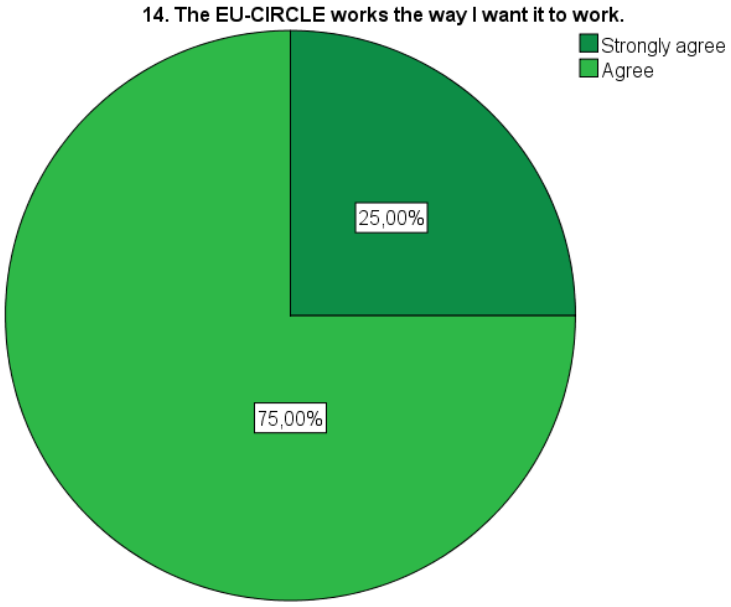
13.2. In my opinion the overall Risk Assessment/Resilience Framework as showcased by the EU-CIRCLE appears to be appropriate and correct-Resilience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	25,0	100,0	100,0
Missing	System	3	75,0		
Total		4	100,0		



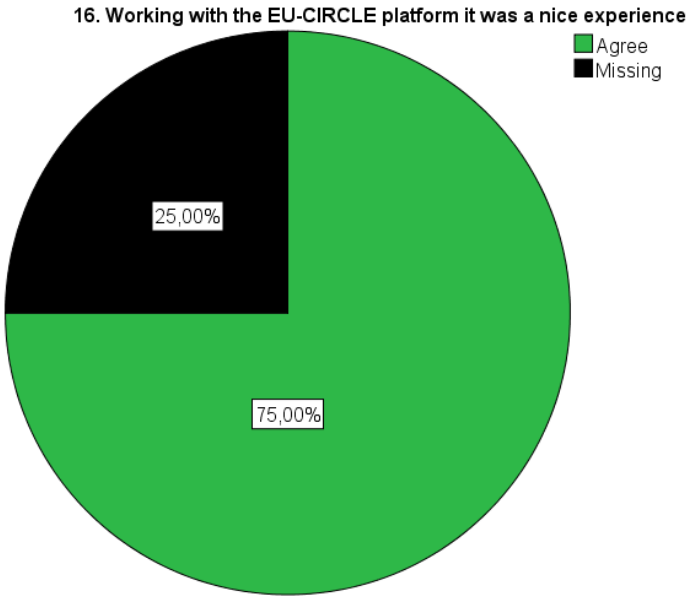
14. The EU-CIRCLE works the way I want it to work.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	25,0	25,0	25,0
	Agree	3	75,0	75,0	100,0
	Total	4	100,0	100,0	



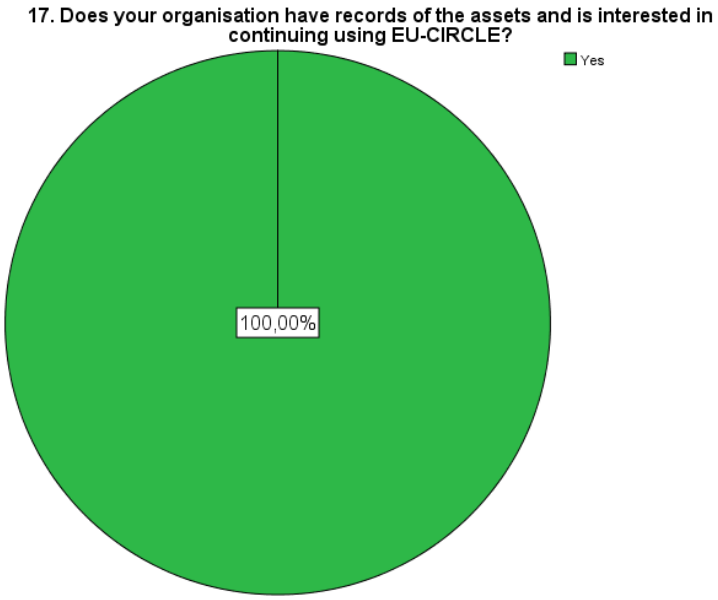
16. Working with the EU-CIRCLE platform it was a nice experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	3	75,0	100,0	100,0
Missing	System	1	25,0		
Total		4	100,0		

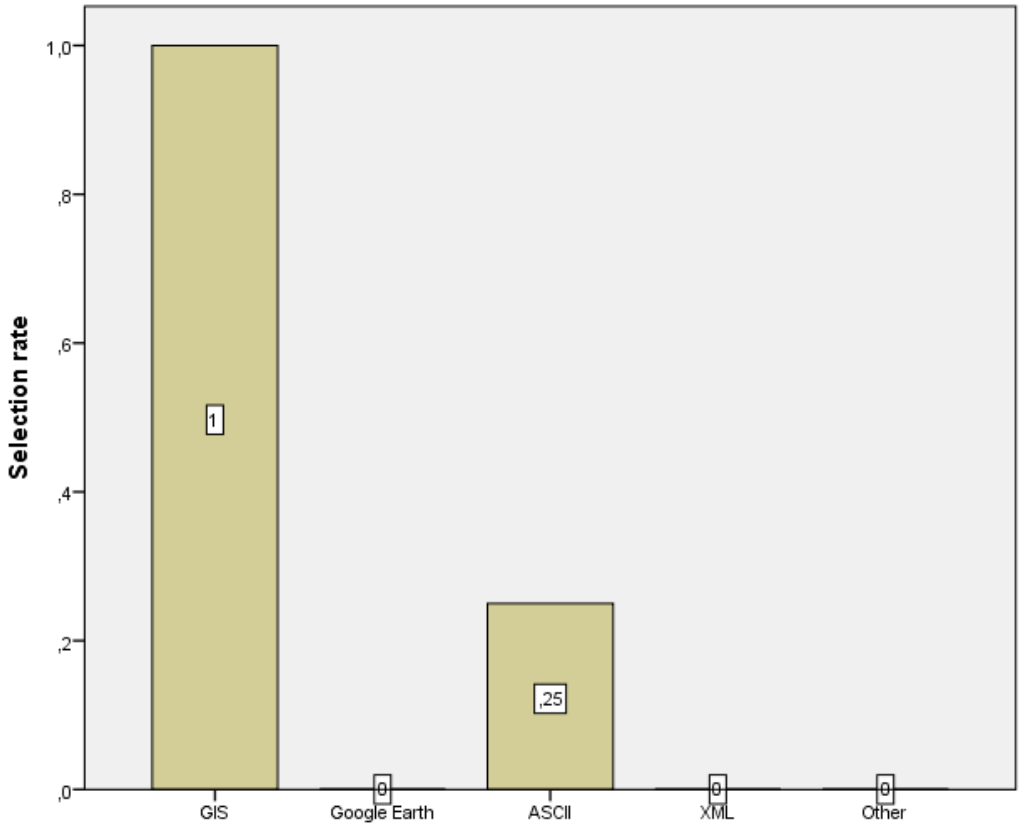


17. Does your organisation have records of the assets and is interested in continuing using EU-CIRCLE?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	100,0	100,0	100,0

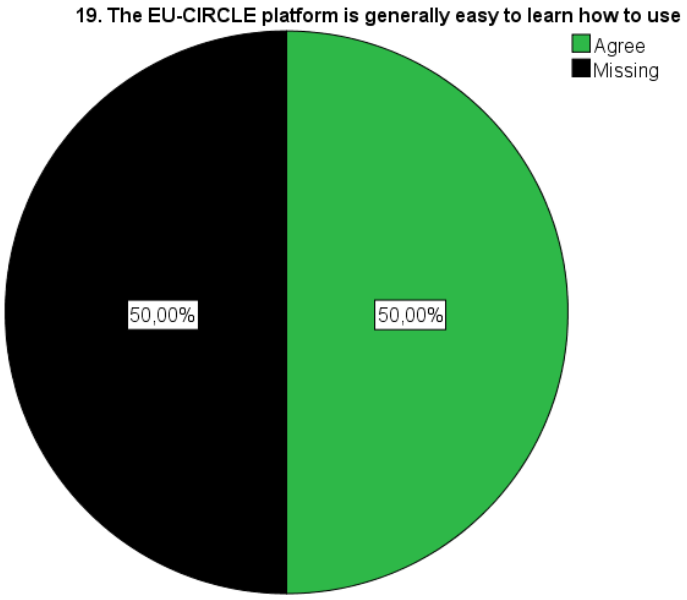


18. If yes, in what format is the data available (also consider available conversion tools)?



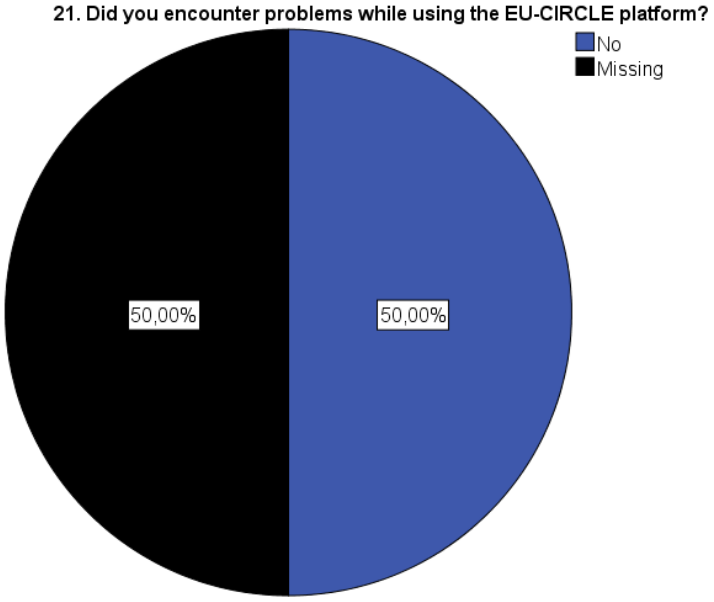
19. The EU-CIRCLE platform is generally easy to learn how to use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	2	50,0	100,0	100,0
Missing	System	2	50,0		
Total		4	100,0		

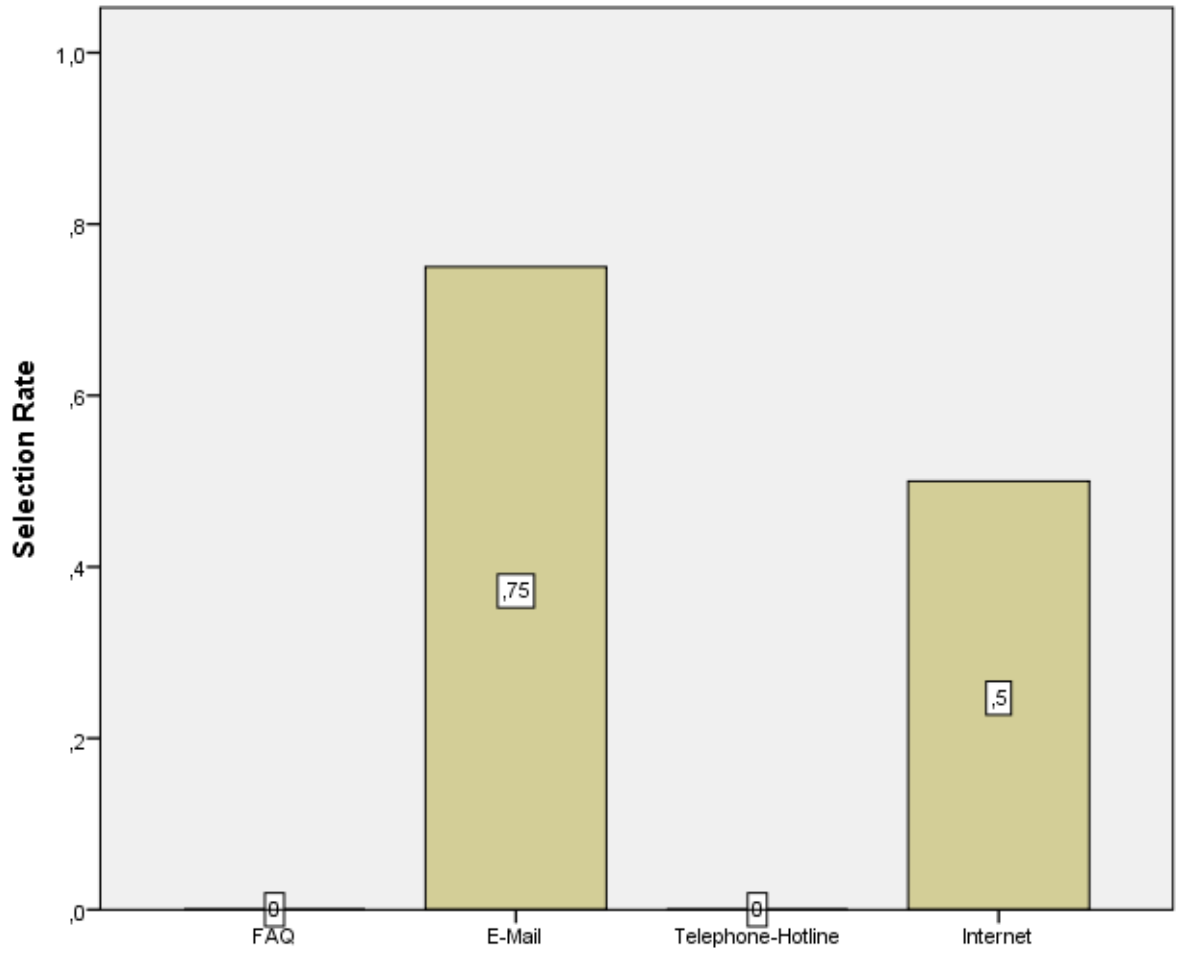


21. Did you encounter problems while using the EU-CIRCLE platform?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	2	50,0	100,0	100,0
Missing	System	2	50,0		
Total		4	100,0		

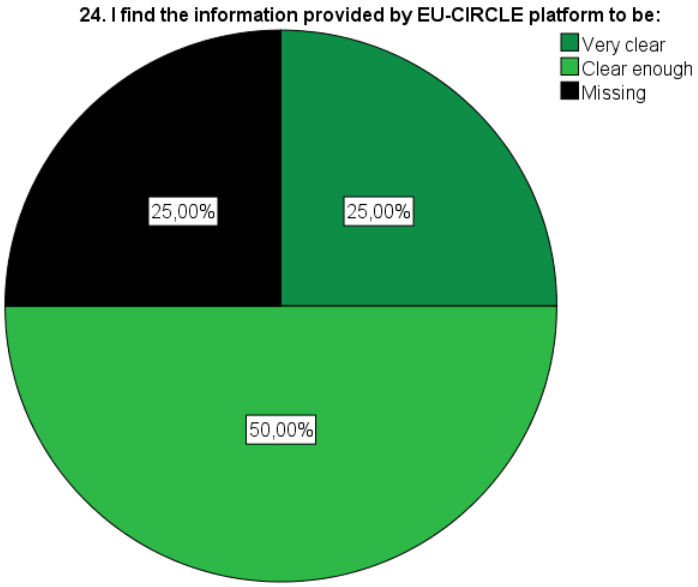


23.2. In case you would be a formal user, which kind of support do you prefer?

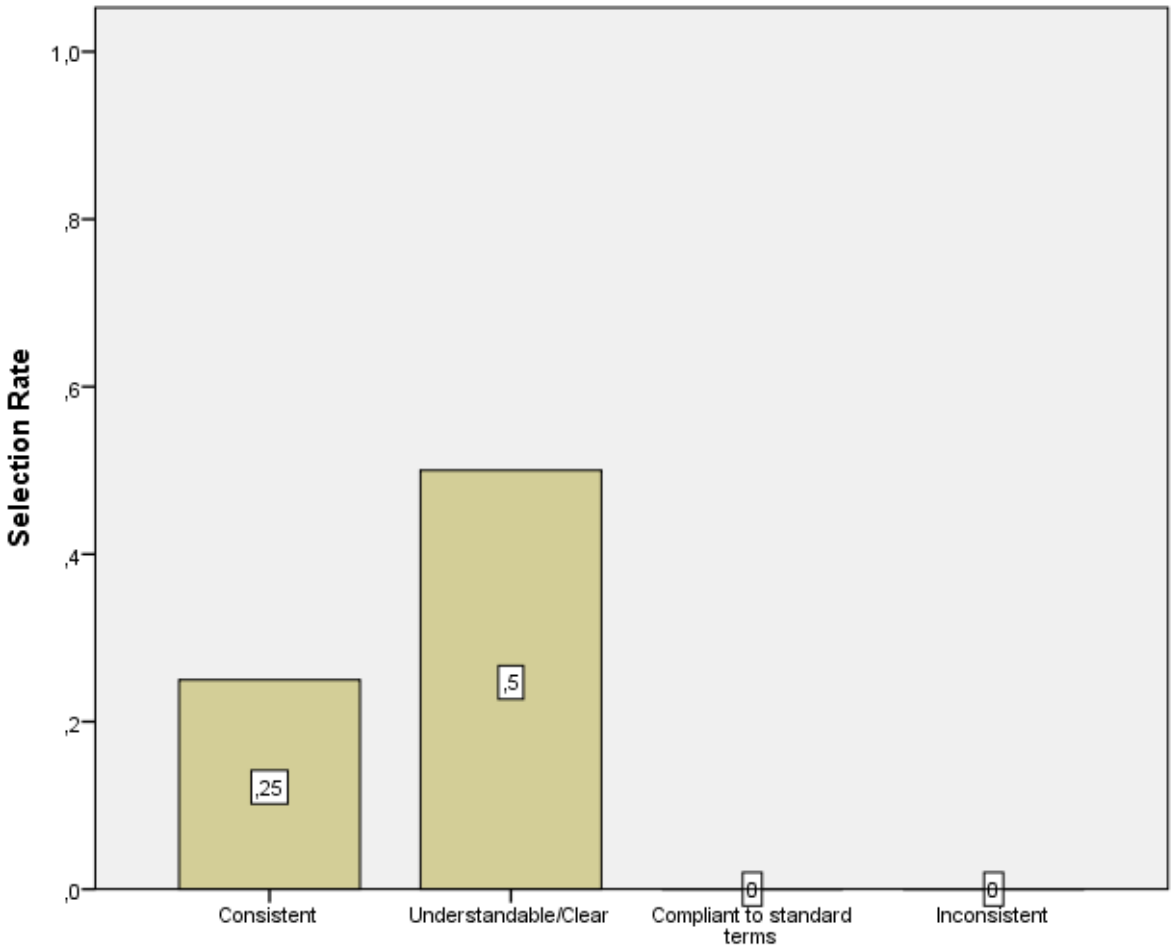


24. I find the information provided by EU-CIRCLE platform to be:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very clear	1	25,0	33,3	33,3
	Clear enough	2	50,0	66,7	100,0
	Total	3	75,0	100,0	
Missing	System	1	25,0		
Total		4	100,0		

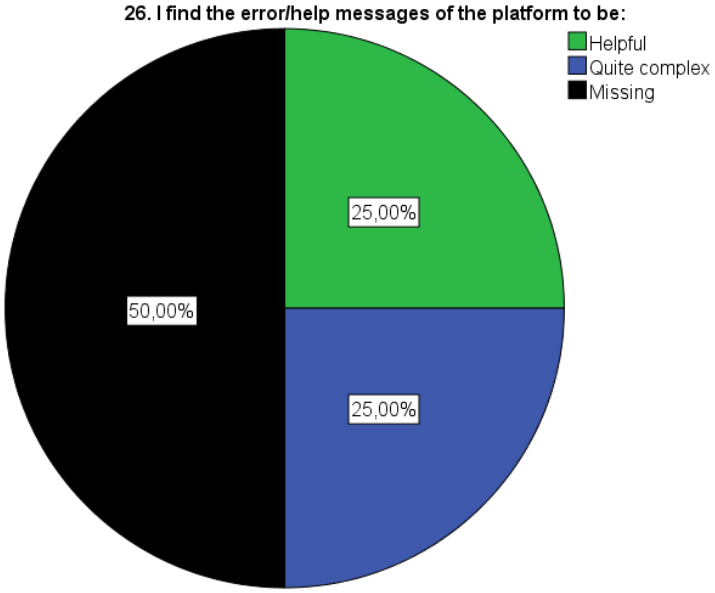


25.1. I find the terminology used in EU-CIRCLE to be (please tick all that apply):

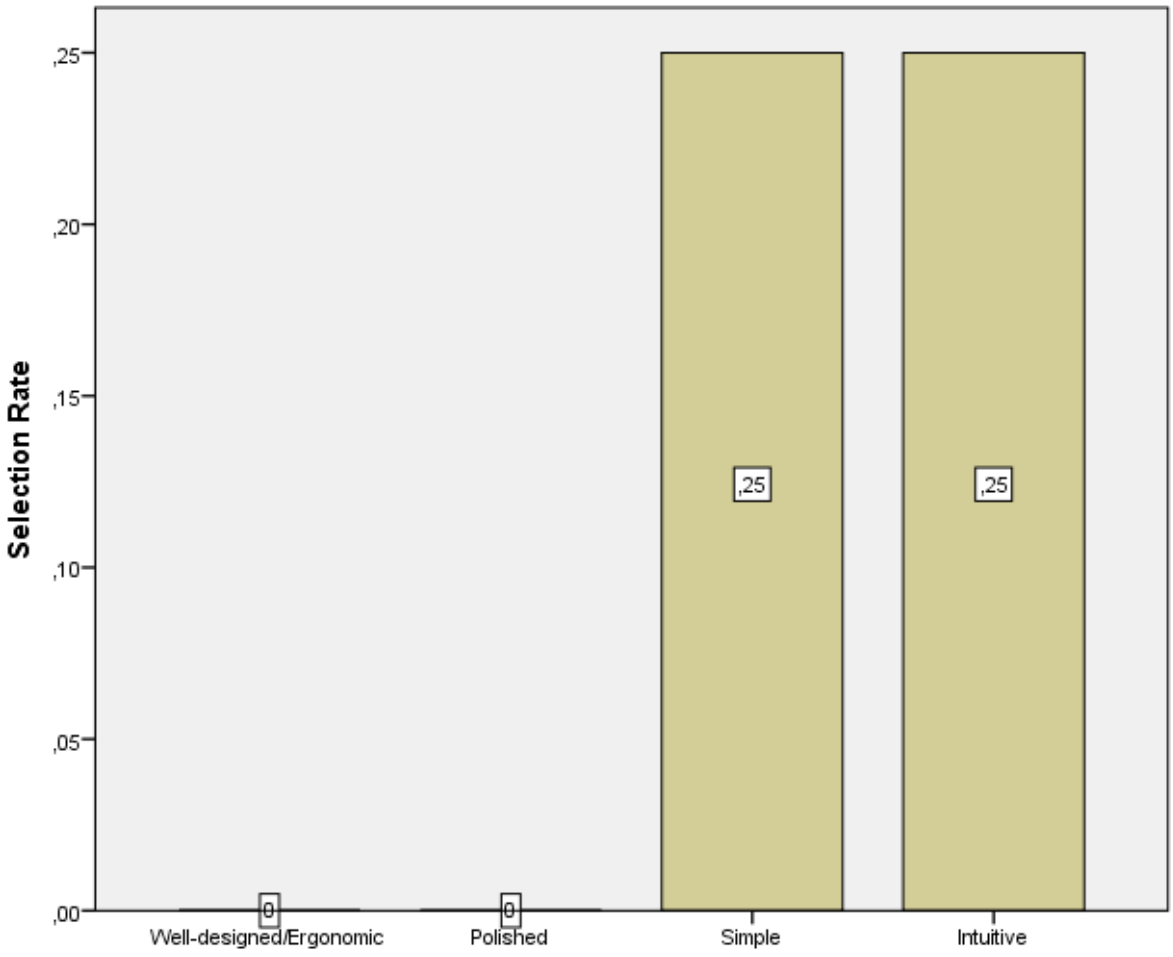


26. I find the error/help messages of the platform to be:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helpful	1	25,0	50,0	50,0
	Quite complex	1	25,0	50,0	100,0
	Total	2	50,0	100,0	
Missing	System	2	50,0		
Total		4	100,0		

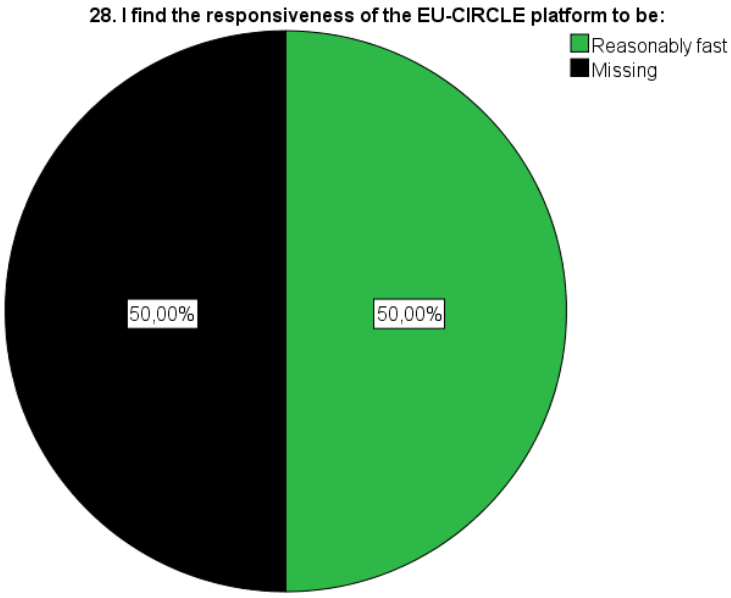


I think the platform's user interface is (please tick all that apply):



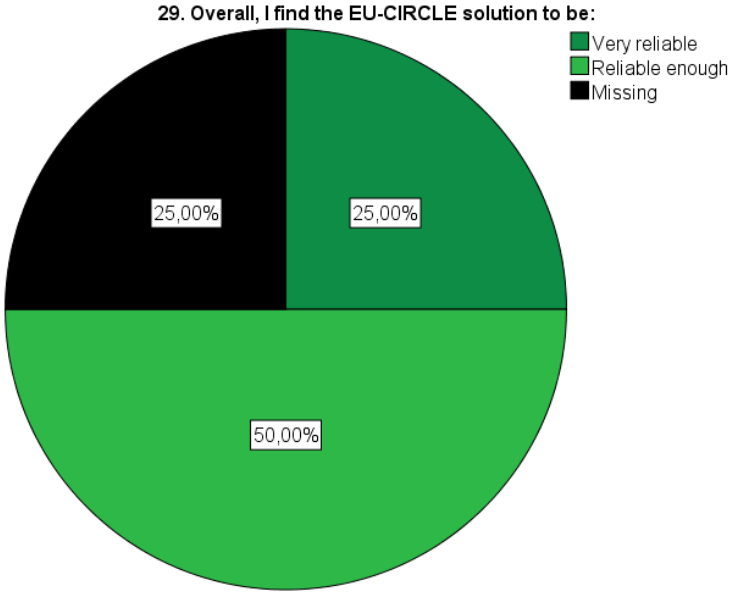
28. I find the responsiveness of the EU-CIRCLE platform to be:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Reasonably fast	2	50,0	100,0	100,0
Missing	System	2	50,0		
Total		4	100,0		



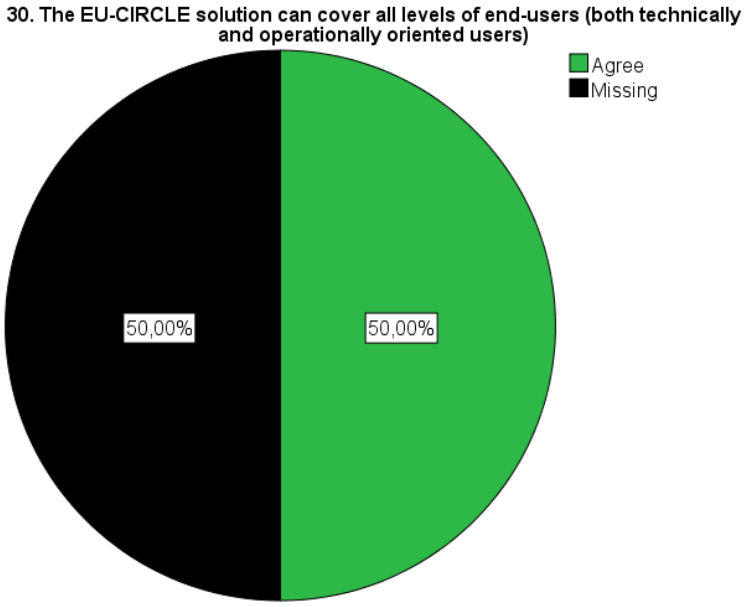
29. Overall, I find the EU-CIRCLE solution to be:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very reliable	1	25,0	33,3	33,3
	Reliable enough	2	50,0	66,7	100,0
	Total	3	75,0	100,0	
Missing	System	1	25,0		
Total		4	100,0		



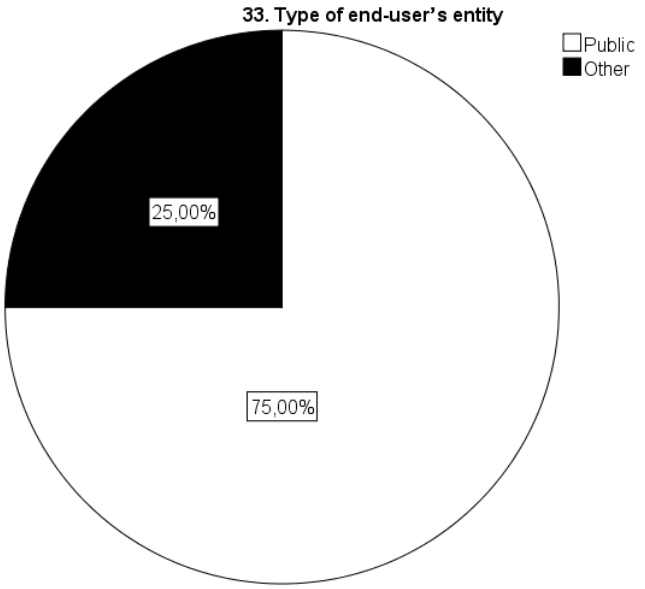
30. The EU-CIRCLE solution can cover all levels of end-users (both technically and operationally oriented users)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	2	50,0	100,0	100,0
Missing	System	2	50,0		
Total		4	100,0		



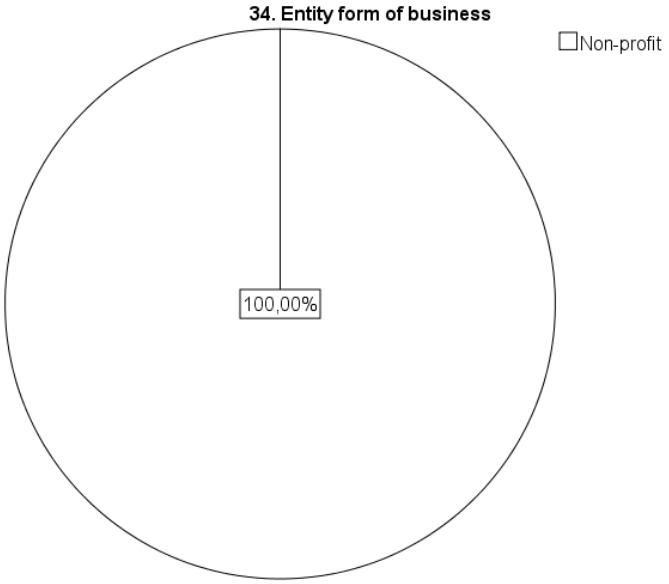
33. Type of end-user's entity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Public	3	75,0	75,0	75,0
	Other	1	25,0	25,0	100,0
	Total	4	100,0	100,0	



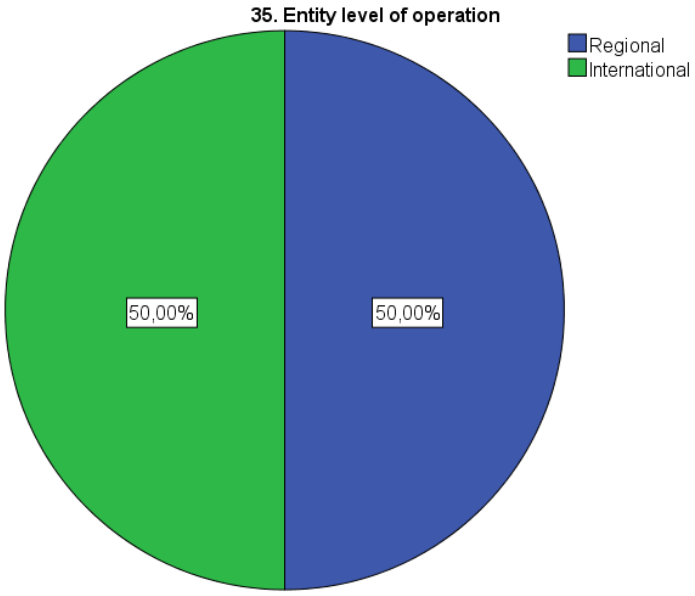
34. Entity form of business

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Non-profit	4	100,0	100,0	100,0



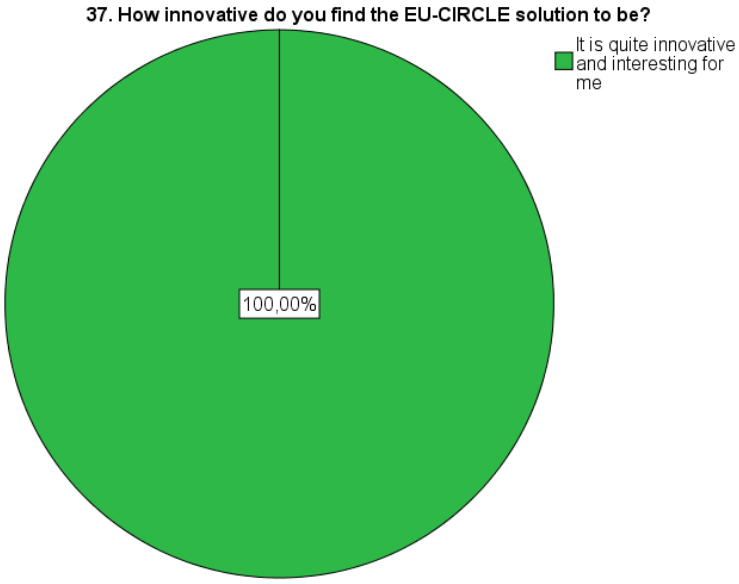
35. Entity level of operation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Regional	2	50,0	50,0	50,0
	International	2	50,0	50,0	100,0
	Total	4	100,0	100,0	



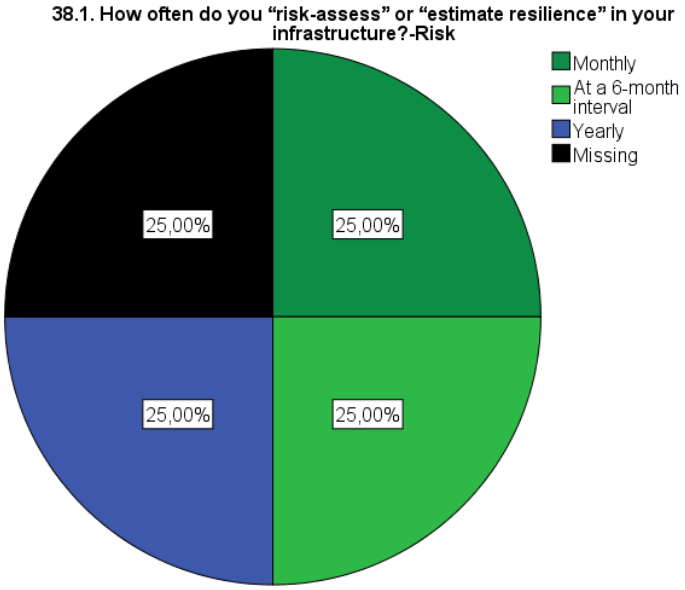
37. How innovative do you find the EU-CIRCLE solution to be?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	It is quite innovative and interesting for me	4	100,0	100,0	100,0



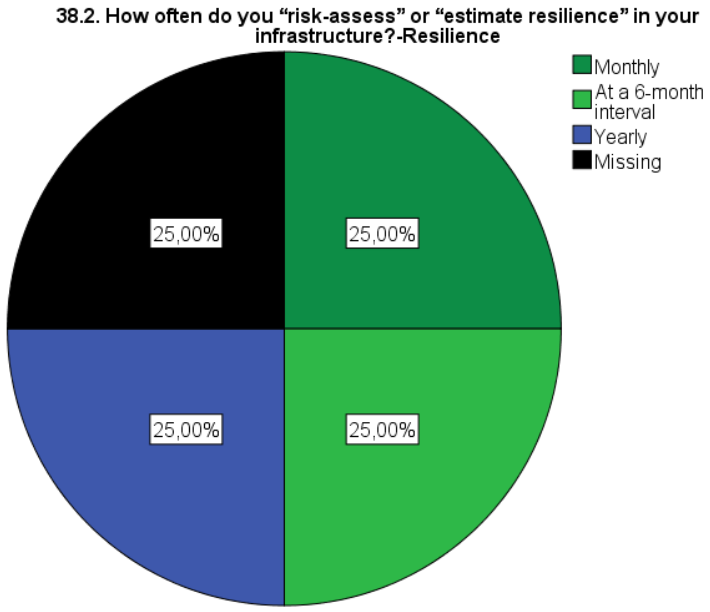
38.1. How often do you "risk-assess" or "estimate resilience" in your infrastructure?-Risk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Monthly	1	25,0	33,3	33,3
	At a 6-month interval	1	25,0	33,3	66,7
	Yearly	1	25,0	33,3	100,0
	Total	3	75,0	100,0	
Missing	System	1	25,0		
Total		4	100,0		



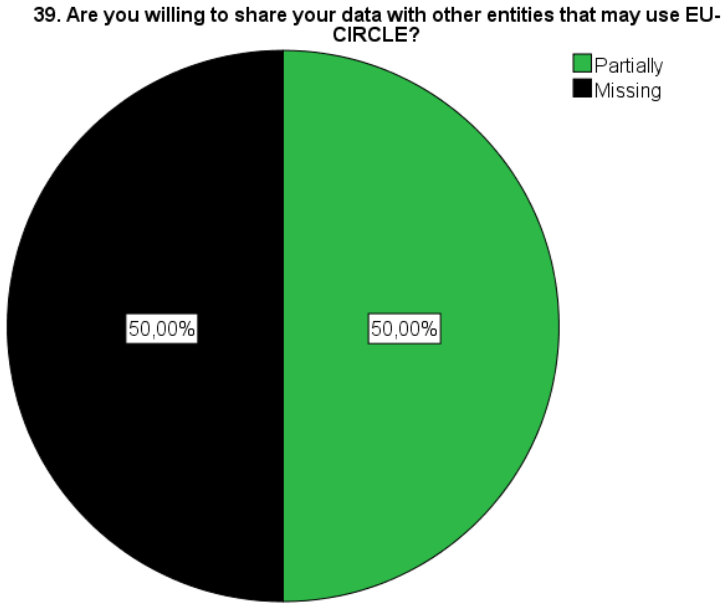
38.2. How often do you "risk-assess" or "estimate resilience" in your infrastructure?-Resilience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Monthly	1	25,0	33,3	33,3
	At a 6-month interval	1	25,0	33,3	66,7
	Yearly	1	25,0	33,3	100,0
	Total	3	75,0	100,0	
Missing	System	1	25,0		
Total		4	100,0		



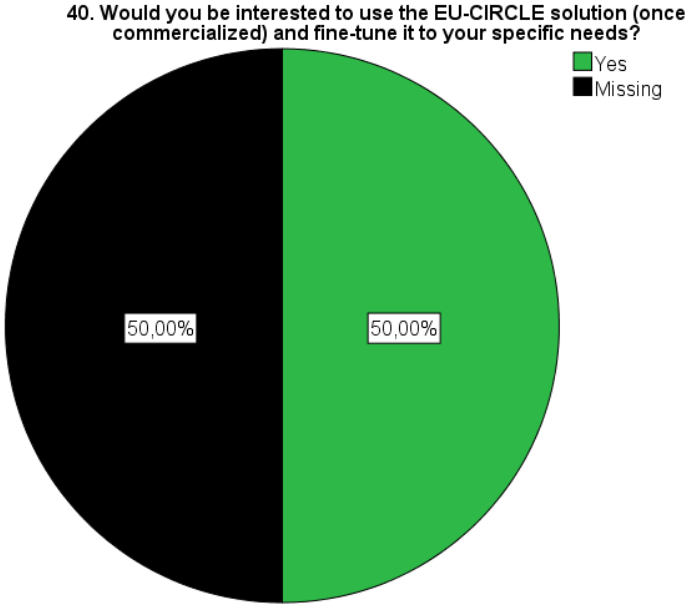
39. Are you willing to share your data with other entities that may use EU-CIRCLE?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Partially	2	50,0	100,0	100,0
Missing	System	2	50,0		
Total		4	100,0		

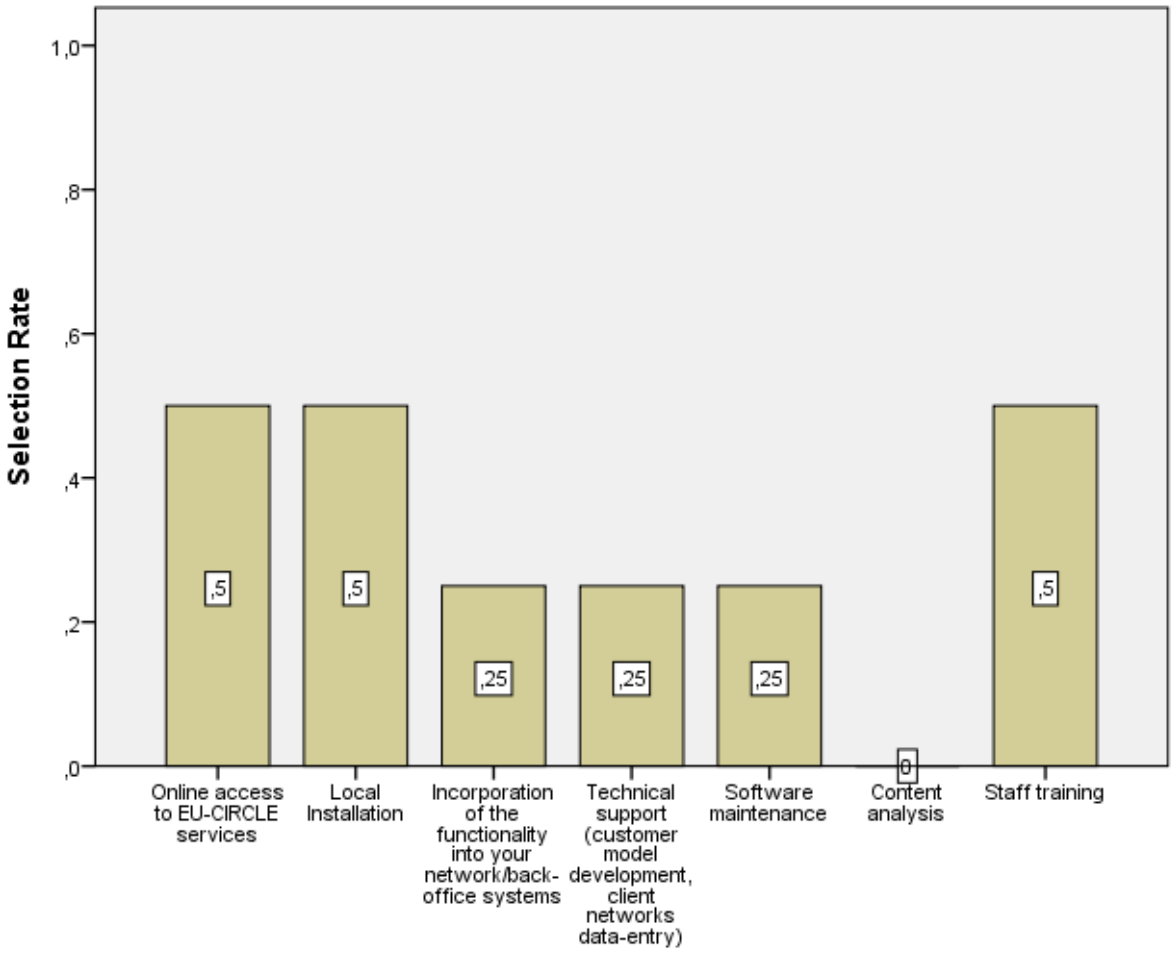


40. Would you be interested to use the EU-CIRCLE solution (once commercialized) and fine-tune it to your specific needs?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	50,0	100,0	100,0
Missing	System	2	50,0		
Total		4	100,0		



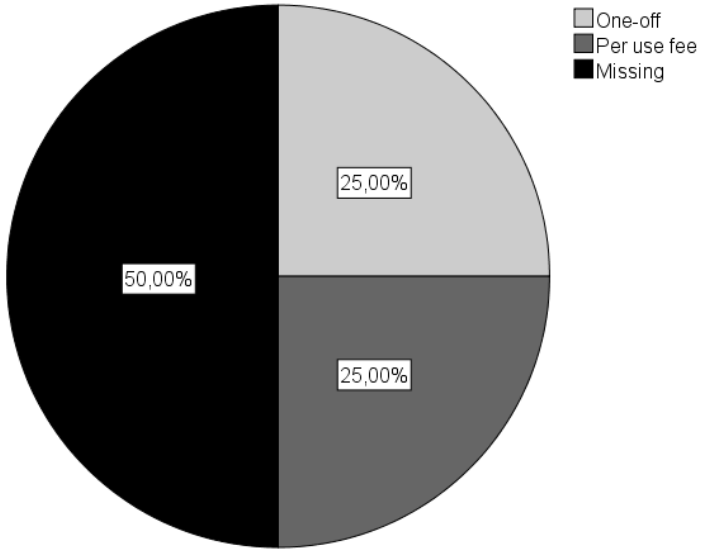
41.1. If yes, which one of the following services would you be interested in (please tick all that apply)



42. Which form of payment would you find convenient for the EU-CIRCLE services (please number in order or convenience – from 1 "most convenient" to 4 "least convenient")?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	One-off	1	25,0	50,0	50,0
	Per use fee	1	25,0	50,0	100,0
	Total	2	50,0	100,0	
Missing	System	2	50,0		
Total		4	100,0		

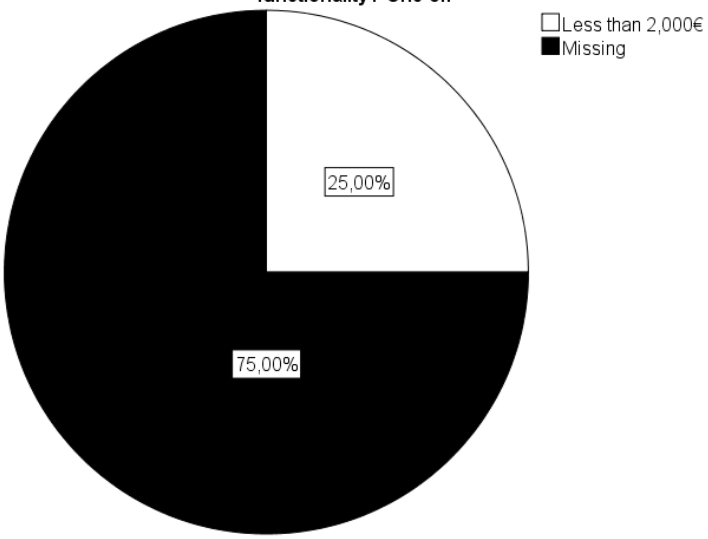
42. Which form of payment would you find convenient for the EU-CIRCLE services (please number in order or convenience – from 1 "most convenient" to 4 "least convenient")?



43.1. How much would you be willing to pay to gain access to the EU-CIRCLE functionality?-One-off

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 2,000€	1	25,0	100,0	100,0
Missing	System	3	75,0		
Total		4	100,0		

43.1. How much would you be willing to pay to gain access to the EU-CIRCLE functionality?-One-off



44. Would you recommend the EU-CIRCLE solution?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	75,0	100,0	100,0
Missing	System	1	25,0		
Total		4	100,0