Developing metrics and instruments to evaluate citizen science impacts on the environment and society

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Abstract (for dissemination)	A clear strategy to the widespread dissemination of the project outcomes and deliverables; and the design of an exploitation strategy ensuring the long-term, post-grant sustainability and replicability of the outcomes and the expansion of the end-user base of the MICS platform. Detailed communication plan, and materials, including logos, templates for presentations, presentations about the project for the use of the partners. This deliverable will be updated and reported at each project meeting, from M04 to M36.				
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Table of contents

1 Executive summary

The MICS project develops approaches and tools to evaluate citizen-science impacts. The objectives of this document are to define a *plan for the exploitation and dissemination of the results* (PEDR) **of MICS** and to provide a ***data management plan*** **(DMP)**. The major results, or outcomes, of the project considered are:

1) an innovative **toolbox** to measure citizen-science impact on the following domains:
    a. society
    b. governance (including democracy and policy)
    c. the economy
    d. the environment
    e. environmental sciences
    f. the attitudes and behaviours of the participating citizen scientists
2) a set of **recommendations, guidelines, and indicators** for measuring citizen-science impact (using nature-based solutions as initial case study)
3) a **generalisation blueprint** for extending and transfer project outcomes to other domains beyond *nature-based solutions* (NBSs) and the environment

The target audiences for the dissemination of results are defined in this document as:

- Civic educators and scientists as project managers
- Public authorities and decision makers (including policy makers)
- Researchers and scientists
- Citizens' networks

The dissemination strategy towards these audiences is established here, together with an initial exploitation strategy for the results. This document also includes the definition of specific outputs, advice on market research and analysis, including analysis techniques such as SWOT (strengths, weaknesses, opportunities and threats), and PESTEL (political, economic, social, technological, environmental, and legal), to identify future exploitation opportunities. A business model canvas is also included. The exploitation management section describes the management of MICS's knowledge, IPR management, as well as post-Brexit data management information. The final section of this document explains the Data Management Plan adopted by MICS.

2 Introduction

2.1 Background

The MICS project develops approaches and tools to evaluate citizen-science impacts. The test and validation of these tools focus on the area of *nature-based solutions* (NBSs), defined by the *International Union for Conservation of Nature* (IUCN) as "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits".

The MICS project specifically aims to:

1. provide comprehensive, participatory and inclusive metrics and instruments to evaluate citizen science impacts;
2. implement an impact-assessment knowledge-base through toolboxes for methods application, information visualisation, and delivery to decision makers, citizens and researchers;
3. improve the effectiveness of nature-based solutions through test-site development and citizen-science tool validation;
4. generate new approaches that strengthen the role of citizen science in supporting research and development;
5. foster a citizen-science approach to increase the extent to which scientific evidence is taken up by policy makers through recommendations and guidelines.

The result is an integrated platform where these metrics and instruments are available for use by anyone involved in a citizen-science project wanting to understand its impact, whether at the planning stage or several years after the project's conclusion. This platform is validated by pilot testing in four test and validation sites across Europe. These sites explore the applicability of MICS impact-assessment tools in regions with differing needs, contexts, and approaches to nature-based solutions, and with various levels of citizen-science application. For example, in Western Europe, river restoration is increasingly carried out within an ecosystem-based management framework at river or catchment scale; in Southern Europe, river restoration tends to be issue-specific with some ecosystem relevance; in Central and Eastern Europe, river restoration is about ecosystem protection and related to existing infrastructure. The four test and validation sites selected are in the UK, Italy, Hungary and Romania.

The objectives of this PEDR are to plan for the dissemination and exploitation of MICS outcomes and provide a data management plan.

2.2 MICS' major results

The main result of the project is an integrated platform, where MICS metrics and instruments are available for use by anyone involved in a citizen-science project wanting to understand its impact, whether at the planning stage, during the project or after the project's conclusion.

Hence, the major outputs of the project for dissemination and exploitation are predicted to be:

- a **toolbox** (WP3) to measure citizen-science impact on the following domains:
    a. society
    b. governance (including democracy and policy)
    c. the economy
    d. the environment

e. environmental sciences
f. the attitudes and behaviours of the participating citizen scientists

● a set of **recommendations, guidelines, and indicators** (WP2) for measuring citizen-science impact (using NBSs as initial case study)

● a **generalisation blueprint** (WP2) for extending and transfer outcomes to other domains beyond NBSs and the environment

More precisely, these outputs will consist of:

- MICS tools: the MICS web-platform, algorithms, new methods, and hosting servers for data, tutorials and educational materials to support and increase awareness;
- impact-assessment systems;
- a white paper on citizen-science impact-assessment for evidence-based policies and stakeholder practice;
- repositories of open information;
- a data interoperability service;
- metrics and indicators on citizen-science impact;
- data collected through the MICS platform;
- a set of recommendations and guidelines;
- a generalisation blueprint.

3 Dissemination strategy

The objective of the dissemination strategy is to identify and organise the activities to be completed in order to maximise the influence of the project and to promote the exploitation of the project results.

Specifically, the objectives of the dissemination are:

- To raise public awareness about the project, its expected results and progress within defined target groups using effective communication means and tools.
- To exchange experience with projects and groups working in the field in order to join efforts, minimize duplication and maximize potential.
- To disseminate the fundamental knowledge, the methodologies and technologies developed during the project.
- To pave the way for a successful commercial and non-commercial exploitation of the project outcomes.

The dissemination strategy and activities follow principles and best practices successfully tested by the partners in other projects and in line with the EC Guidelines for successful dissemination:

- All research results/reports are duly reviewed and a copy is sent to relevant partners involved in the project before these are published or disseminated. When appropriate, the reports refer to other research projects and build on the existing results and literature.
- Research is conducted following sound analysis and scientific practice principles, considering as much as possible policy requirements and needs.
- All partners who have contributed to the project activities will be duly informed about the final outcomes and the implications stemming from project results.

- All public results will be accessible from the project website and usable from all parties who may benefit from them.

The definition of the dissemination strategy is based on the identification of the following elements:

- the subject of dissemination;
- the identification of target audience;
- the definition of methods, tools, and timing;
- the dissemination management and policy (who is responsible and how dissemination is ruled).

3.1 Subjects of dissemination

- Concept of citizen science
- MICS's objectives
- Relevant outcomes and results of the project (e.g. toolbox, deliverables)

3.2 Target audiences

The main target audiences for the exploitation and dissemination of the MICS project have being identified as **stakeholders that are involved in the definition or implementation of citizen-science actions**, or nature-based solutions, such as project managers that need to evaluate the performance of citizen science projects. Further target audiences have been classified in this document following the criteria defined in the DoA (description of action) and have been grouped in additional categories, as shown in the table below. These groups may change or include sub-categories during the lifetime of the project, as supplementary or more specific target audiences may be acknowledged. Moreover, the European Citizen Science Association will also be regarded as a target audience for dissemination, as many of MICS's outcomes will be especially exploitable by this association.

Table 1. Target audiences for the exploitation and dissemination of results

Type of audience	Description	Interest in the project results
Civic educators and scientists as project managers	Project managers dealing with citizen science projects, e.g. sister project EU-Citizen.Science and other EU projects working in similar domains	Use of MICS tools to assess the performance of the projects
Public authorities and decision makers (including policy makers)	This is a broad group comprising local, regional authorities, representatives and associations, and Public Administrations at national and international level, such as: - the European Commission; - entities responsible for the development of monitoring programmes; - entities responsible for reporting and policy.	Improved data sets as inputs into decision-making process; verification and validation of management solutions
Researchers and scientists	All research communities interested in the MICS project's developments, results and innovation activities, particularly researchers working in the field of citizen science	Additional sources of data quality assessment, to provide more reliable scientific results and impact

Citizens' networks	Associations or bodies dealing with citizen science networks	Improved services for their area of interest, such as tools to evaluate citizen science activities

3.3 Dissemination activities timing

Dissemination activities are planned in accordance with the stage of the development in the project as planned in the Description of Action (DoA).

Although a number of dissemination activities will take place during the entire length of the project, the most significant dissemination activities will take place as the final research results will be available.

1. Initial phase (months 0-4): It includes the establishment of the MICS project website, analysis of relevant information resources in terms of identification of dissemination opportunities and creation of basic dissemination tools including graphical identity of the project (i.e. project logo, templates for project documents and for project presentations).
2. Targeted dissemination phase (months 4-36): The consortium will enrich the website, publish a project brochure, issue the first press release and attend selected events. Preliminary project results will be presented to the target audiences and the data generated will begin to be available through the website and selected repositories.

3.4 Dissemination management

3.4.1 Distribution of responsibilities

The responsibilities for all partners are well described in the Grant Agreement. It is important that the consortium creates a corporate image of trust and confidence. It has public responsibilities and internal interests (individual and group visibility, protection of own interests, protection of knowledge, economic and scientific exploitations) that have to be matched.

3.4.2 Dissemination monitoring and reporting

All consortium partners are encouraged by the partner responsible for dissemination to report the results of each dissemination activity immediately after they are presented. The reports shall include feedback gathered by the respective partner from the target audience (if applicable), eventually gained contacts to be listed in the contact repository used for further dissemination purposes.

All partners are invited to share the dissemination material documents and files (text, audio, video, etc.) by uploading them on the project internal platform (OneDrive).

For monitoring purposes, the dissemination activities will be re-assessed regularly during the project's progress meetings.

3.4.3 Evaluation

For the purpose of evaluation of MICS dissemination activities, quantitative indicators and associated metrics are set up, together with other *key performance indicators* (KPIs) for other categories for internal management and monitoring.

Table 2. Key performance indicators and associated metrics for the dissemination of activities

Dissemination KPIs	How to measure (metrics)
Website	Number of monthly visits
	Duration of visits

	Number of downloads per month
	Number of references from external webpages
Social media (e.g. Facebook, LinkedIn, Twitter)	Number of members
	Number of followers
Publications	Number of articles submitted Scientific papers
	Number of articles submitted in other journals/magazines
Attendance of events	Number of attended conferences with posters
	Number of attended conferences with oral communications
	Number of other events (fairs, workshops)
Organisation of events	Number of workshops organised
	Number of registered people in the workshop
	Number of conferences organised

3.4.4 Dissemination and communication elements and tools

The tools in this section will be used for the dissemination of MICS outputs (see Section 3.1). These tools are based on the communication strategy described in deliverable 5.8, where detailed information can be found.

3.4.4.1 Graphic identity and logo

The logo includes the short name (MICS) and the sentence "Measuring Impact of Citizen Science". It intends to capture the attention of the audience. The logo is used for any (internal or external) deliverable, report and dissemination action.

Figure 1. MICS logo

3.4.4.2 Website

The website [mics.tools] is one of the main communication instruments to reach and engage with the MICS target audiences. It serves as a knowledge platform to our target audiences and as a place to provide access to publications, case studies, tools, MICS news, and citizen-science networks. The website also enables users to easily share information with others, and empower additional people to join the debate about the impact of citizen science. The content is specified in the deliverable on the MICS website. After MICS's project closure, project outputs will likely be integrated into EU-Citizen.Science.

- The website needs to be kept up-to-date with the latest news and latest MICS materials and publications including relevant publications on citizen science and river restoration from MICS partners. This is the responsibility of all partners.
- All partners will promote the MICS website on their own individual websites and link to the MICS website.
- All partners to include the URL to the MICS website in all outreach materials.
- All partners to encourage other existing networks to link to the MICS website.

3.4.4.3 Promotional events, seminars, conferences

MICS will use a selection of relevant events (international, European, regional, national or local levels) to:

- give presentations and participate in panel discussions;
- network;
- show and distribute outreach materials such as MICS's information leaflet, posters and specific information leaflets on main themes.

This tool will be used to promote discussion on citizen-science impact and the work of MICS and to trigger dialogue on the main themes.

All partners are responsible for the dissemination in relevant events. Some events are identified already, in which MICS will consider to cooperate. Partners have the responsibility to update other MICS partners of events throughout the project.

3.4.4.4 Engagement events and field visits

MICS will organise engagement events throughout the EU Member States where test and validation sites are located:

- events targeted at existing citizen-science networks;
- events aimed at civic educators, scientists, and relevant policy makers;
- events in the form of field visits targeted predominantly at civic educators, scientists, relevant policy makers and practitioners.

Engagement events should be used to empower additional people to join the debate about the impact of citizen science, share relevant knowledge, and promote MICS as a source of knowledge and impact-assessment tools. Target audiences should be stimulated to exchange views and knowledge with each other about the impact of citizen science and river restoration.

It is important that the topics of the different planned engagement events and field visits focus on the key challenges and opportunities identified by the regions. This means that both the topics and participants need to be carefully selected. The content will also be informed by the selection of the main MICS communication themes. Engagement events can include trainings, presentations, discussions, excursions. All partners are responsible to participate in these types of events.

3.4.4.5 Social media

MICS will use a number of web-based social media instruments. This part of the communication strategy refers to the dissemination activities carried out online on social-media platforms, namely Twitter, Facebook and LinkedIn, initially. Partners will furthermore make use of social media that their organisations are already using, such as Facebook or Twitter.

Not only can the use of social media enhance our coverage in the target audiences, but also the target audiences and stakeholders are, through social media, enabled to easily share news, publications and other information with others. MICS will use social media to promote MICS as a source of knowledge and impact-assessment tools, to empower additional people to join the debate about the impact of citizen science, to distribute knowledge and to encourage target audiences to share their knowledge and views.

The content shall include news and updates, content such as new publications, leaflets, videos, pictures, online discussions on the main themes (e.g. through internet articles and posts), significant milestones

and results of the project; external activities, information in the fields of citizen science and NBSs, conferences and workshops on citizen science

The content shared on social media by the MICS consortium will relate to all activities that are significant for the project itself and for promoting citizen science among a wide public. This can be encouraged through cross-sharing news and publications through social media such as YouTube, SlideShare, LinkedIn, Facebook.

All partners are responsible for publishing posts, but AAWA will be the responsible for the task.

A Twitter account named "MICS project" (@MICSproject) was created and is active [https://twitter.com/MICSproject].

A Facebook page named "MICS Project" was created and is available: [https://www.facebook.com/MICS-Project-1165673216930391/]. Depending on social media, different approaches to communication will be used. Twitter is mostly for "right here, right now" happening, using tags. (The hashtag #MICSproject will used for the project.) Facebook will be used for scheduling posts, articles that are not so much time-bound. All partners will provide such posts. Twitter and Facebook have been linked, Earthwatch is the administrator and AWAA is the editor of the content.

LinkedIn is an additional platform, which will be activated during the first year. Sharing/retweeting each other's posts on the MICS project will favour the diffusion of content. Deliverable 5.8 describes in more detail the quarterly newsletters, social media posts and update strategy. In any case, project social-media channels might evolve during the course of the project, depending also on how we actively engage our stakeholders.

3.4.4.6 Newsletter

MICS will create a newsletter in the following formats:

- An online newsletter in the form of a blog. Partners can copy the content of different news-items and distribute this using their existing communication materials such as their own newsletters and their websites.
- Distribution of a MICS newsletter three or four times per year. The content will be similar to the one used as the MICS news items on the blog. This newsletter will be sent to the contacts in the database plus additional contacts obtained by MICS, which for some reason are not in the database.

The newsletters will be delivered using Mailchimp (a free software used for editing electronic newsletters), every three-five months, starting from Month 5. Overall, about ten newsletters will be produced throughout the duration of the project (three years). Each newsletter will be assigned an editorial partner from within the Consortium. The editorial partner of the newsletter will have to identify the other contributing partners and coordinate their input to the newsletter.

The newsletter will have as content event announcements, internet articles related to themes or events, event reports and presentations, new publications and outreach products, best practice case studies. More specifically, the newsletter will include (but will not be limited to):

1. An editorial piece, which will be written by the editorial partner of the newsletter. This will focus, for example, on a specific aspect of the project or on key aspects of citizen science (especially in relation with nature-based solutions).

2. Progress updates of the MICS project. This section will briefly summarise the status of the project and recent updates.
3. Description of the results of the project and of key features of citizen science. This section will present relevant results of the project as well as a more in-depth discussion on a specific aspect related to citizen science, especially in relation with nature-based solutions.
4. Promotion of citizen-science events (e.g. workshops, conferences). The newsletter will serve as a reference for stakeholders and people interested in citizen science to be updated with the upcoming events in the field.
5. External references and links to various topics related to citizen science and nature-based solutions. Throughout the newsletter (or in a dedicated section) relevant links and information will be provided as additional references of interest.

This tool will be used to promote MICS work, events, publications, news, results and traffic to the MICS website.

The newsletter will be emailed to all of those who subscribe via a subscription management system on the MICS website. It will be publicly available in suitable formats on the MICS website: i) as news stories; and ii) as a pdf file. Google analytics will be used to monitor readership levels. The newsletter will also be sent out to relevant Consortium contacts, with the option to unsubscribe. The Consortium will advertise the subscription webpage to other potential interested parties via their own communications channels.

3.4.4.7 Leaflets and factsheets

See deliverable D1.3 “Project factsheet”.

3.4.4.8 Other communication tools and instruments

Other communication tools and instruments will be used, specifically:

- Face-to-face meetings
- Poster and information boards
- Best practice documentation
- A workshop: MS4 “Workshop with practitioners and researchers from NBSs and other areas to validate the workflow for impact evaluation” (M05) (Task 2.7)
- Non-professionals’ reports

3.5 Dissemination activities

The overall aim of MICS dissemination activities is to ensure wide impact, uptake and use of project results among the target audiences identified in section 3.2.

3.5.1 Publications, conferences and events

The consortium will disseminate generated knowledge by writing open-access scientific or informative publications, and by participating in conferences, meetings, workshops and fairs. As verification KPIs, it is expected to publish at least 10 SCI publications, 15 popular-science publications, 20 conference papers and to assist to 10 thematic events. The tables below (Table 3 and Table 4) summarise many of the dissemination efforts that will be pursued during MICS. These tables are flexible to some extent, since future events and conference may change or new opportunities may become available.

Table 3. Publications for the dissemination of MICS results

Publications	Leading Partners	Journal or editor
SCI publications. Exploitation of MICS results for the scientific audience through academic papers		
Impact assessment (1)	IHE Delft	Environmental Impact Assessment review
Citizen Science (1)	Earthwatch	Citizen Science: Theory and Practice
Citizen Science (3)	Earthwatch, IHE Delft, AAWA	Frontiers in Ecology and the Environment Ecology and Society
Environmental innovation and social change (2)	RRC, AAWA	Environment Innovation and Societal Transitions Technological Forecasting and Social Change
Environmental Policy (3)	GEO, GeoEcoMar, RRC	Journal of Management Studies
Popular Science publications		
2 articles (MICS)	Earthwatch, IHE Delft	Scientific American and National Geographic
1 article (MICS)	IHE Delft	UPDATE Magazine (Bi-annual)
1 article (MICS)	Earthwatch	Wired magazine
1 review article (MICS)	IHE Delft	Nature
7 newsletters (MICS)	IHE Delft, GeoEcoMar, GEO	UNESCO IHP Water Centres, Ground Truth 2.0, WeObserve, AfriAlliance, NAIAD and DANUBIUS-PP, EMG group
8 reports (MICS, policy)	RRC, GeoEcoMar	6 in RRC/ECRR bulletin and 2 in local press

Table 4. Events for the dissemination of MICS results

Events	Partner attending
Citizen Science conference (CitSci2019, USA)	Earthwatch
Annual Extreme Citizen Science conference (ExCites)	Earthwatch, RRC
COST ACTION workshop on 'Interoperability' in Enschede, March 2019.	Earthwatch
IHE Delft Annual Water sector market with participants from the international private sector	IHE Delft
Water supply and Sanitation Technology Platform (WssTP) events 2019, 2020,	IHE Delft
International Workshop on the sharing economy	RRC
Final conference Groundtruth 2.0, Oct 2019	IHE Delft, Earthwatch
WeObserve & AfriAlliance Cops	IHE Delft
COWN international conference (Citizen observatories for natural hazards and water management)	AAWA
Bi-annual Water Blitz	AAWA
Australia Citizen Science Conference 2020	Earthwatch
European Citizen Science General Assembly, 2019, 2020, 2021	Earthwatch
European Citizen Science conference Trieste, 2020	Earthwatch
Nature-Based solutions and environmental research	
UK 25 year Environment plan call 2019	RRC and Delft
NBS planning and implementation workshop at demo-sites NAIAD	GeoEcoMar
European River restauration Symposium 2019, 2020	RRC
Euro INBO meeting 2019,2020 and 2021	RRC
I.S. River conferences 2021	RRC, AAWA
SER world conference on Ecological Restauration 2019-2021	GEO
Biodiversity Day hosted by Hungarian Biodiversity Research Society 2019-2021	GEO
European Urban Green Infrastructure Conference 2019 and 2021	GEO
World Water Week Stockholm	GEO, Earthwatch, IHE Delft

3.5.2 Training

Training to prepare members of the consortium to manage and implement the dialogue-based activities in their respective area of operation will be organised to ensure optimum internal communication and mutual learning. Earthwatch and IHE Delft will participate in the training activities at each site (Task 4.1).

A summary of the communiction activities planned throughout the life cycle of the project are shown in the table below (Table 5).

Table 5. Summary of communication activities planned throughout the life cycle of the project.

Activity	KPIs	Expected result
Dissemination plan	% of Implemented actions	100%
Branding and merchandising products	Nº of product developed	6
Media strategy and guidelines to improve communities' communications	Nº media appearances	100
Web platform	Nº unique visitors	10000
Promotional strategy through leading science and technology digital magazines, blogs and portals.	Nº mentions in technology and science key media	10
List of commercial and exploitation partners for the outputs	Nº partners identified Pilot partners secured	20 8
Workshops and site visits commercial and exploitation partners	Nº events	6
LinkedIn profile & activity in target groups	Nº followers on LinkedIn	300
Sponsorship packages	Nº of Sponsors identified Sponsors signed up	10 2
Presence at exhibitions and specialised fairs to demonstrate the utility of the data, services and tools provided by the project.	Nº of events	10
Local business meetings	Nº events meeting	15
Recommendations about the assessment of impact of citizen science	Nº of downloads	3000
Communication of open, peer review of NBSs	Nº of contacted people	300
Networking and lobbying with companies and citizen science experts attending specific events	Nº of contacted people	150
Impact analysis and train the trainer workshops	Nº of workshops	2

4 Exploitation strategy

The exploitation of MICS will help ensure a proper social return for the joint public and private investment in the project. Moreover, the financial sustainability of the project in a pilot to market approach is within the main general objectives, together with the mid- and long-term influence of the European industry of impact assessment and NBS applications. All partners will benefit from their participation in MICS. They will broaden their knowledge base in the field of impact-assessment monitoring by studying the transition from government/ academia-based to government/ academia/ community-based NBS management, and focusing on how people use impact-assessment tools in the new setting, and analysing the technical, practical and psychological aspects of the study.

The project will also facilitate the connection of the project's innovation with applied and industrial research, and the transfer of scientific know-how and technology to businesses, enabling a potential co-

operation between the partners and the private sector. Finally, the direct interaction with end-users' organisations and other stakeholders will enhance the role of the partners as important reference points in innovation in collective awareness, as well as in best-practice dissemination and demonstration.

The exploitation strategy defines a set of action for the whole project period regarding exploitable results, defined as any tangible or intangible output generate as a result of the project.

4.1 Exploitable outputs from MICS activities

Expected major exploitable outputs of the MICS project have being identified (see section 2.2); these will result in more specific outputs derived from the deliverables submitted by the end of the project (Table 6). Additionally, these outputs could lead to new business ideas and opportunities that could arise during the lifetime of the project and will be developed using suitable approaches and tools.

Table 6. Specific exploitable outcomes from MICS's activities

MICS output	Target Users	Steps to ensure exploitation	Benefit
Report on impact-assessment methods adapted to citizen science (D2.3)	- Project managers - Policy makers	- Address or advice the users directly. - Publish the results. - Dissemination of reports and findings.	Increased and updated knowledge on evaluation of citizen science projects, potentially leading to better management Plans and decisions.
Report on citizen-science model for impact-evaluation research (D2.8)	- Project managers - Decision makers - Scientists	Publish and disseminate the report.	Provide a model for citizen science project evaluation
Toolboxes, new methods and algorithms for CS research (3.2) MICS mapping and visualisation tools (D3.1)	- Project managers Policy makers - GEO/GEOSS communities - Scientists - Citizens' networks - Policy makers	Promote through workshops, training activities, events and conferences.	- Improved evaluation of the citizen science projects. Standardisation. - Increase effectiveness and impact of citizen science.
MICS database containing the collected data during the project	- Scientists	Make the database known and available online.	- Database content can be used for further investigation and data mining stakeholders. - Database structure can be re-used for other projects and new data can be added from other areas.
MICS repository and website (D3.3 & D5.7)	- Scientists - Project managers - Decision makers - GEO/GEOSS communities	- Present the project, web page and repository in all relevant fora. - Produce and distribute articles and reports, referring to the project. - Link to other relevant web sites.	Keep all interested parties informed about the progress of the project.
Recommendations about the impact-	- Scientists	- Address or advice (EU) policy	- MICS will contribute to an enhanced approach to citizen science evaluation for the project

assessment of citizen science (D5.6)	- Project managers - Decision makers - GEO/GEOSS communities	makers and project managers. - Publish the recommendations through dissemination tools.	managers, based on well-founded research and tested results, providing guidance to decision/policy makers. - Advise the Commission on what would be most likely to happen if MICS recommendations are adopted. - Prepare industry and stakeholders for what these types of changes might entail in practise with respect to citizen science projects.

In addition, participating in standardisation activities will enable MICS to:

- increase knowledge and use of standards, especially in MICS case study countries and EU, but over time in other areas where the standards are applied;
- establish contacts with stakeholders, experts and regulators at European and worldwide levels;
- contribute to the development of new standards and thereby improve communication, understanding and evaluation;
- reach stakeholders and audiences that would not be reached by other dissemination and communication activities, both during the standardization process and after the standard publication.

4.2 Market research and analysis process

Towards the end of the project, when the outcomes of the project will be well-defined, market analysis will help identify the value of the MICS products and services, to understand and define business models suitable for MICS.

The first step towards the market analysis is a comprehensive identification of all the products and services offered by the MICS project. Some of these were identified in section 4.1, but new ones may be identified during the project period. Once these are defined, the unique selling points and value proposition assessments can be elaborated.

The next step is to identify the target markets for the products and services, as well as the potential groups that would pay for the MICS products and/or services. Segmenting the market according to the stakeholder's requirements will also be considered, as it is an easier way to meet their demands.

The *total addressable market* (TAM) may well be estimated through surveys and interviews with potential stakeholders to understand those who could benefit from MICS products and services. If applicable, the geographical expansion (outside of Europe) of the market research will be contemplated.

In the case of a new project or business venture is identified, it is recommended to start the planning by completing a SWOT (strengths, weaknesses, opportunities and threats) analysis (see table 7). This analysis involves specifying the objective of the venture and identifying its internal strengths and weaknesses, as well as its external opportunities and threats.

Table 7. Example of the strengths, weakness, opportunities and threats (SWOT) analysis for the MICS project

	Project managers / Scientists	Policy makers
INCENTIVES	Tools available to evaluate the performance of citizen science projects	Improvement of the use of public resources, management and planning policies. Project evaluation tools available to provide take decisions.

Strengths	Weaknesses
• Data quality will be improved • Partners have experience in the field of citizen science assessment • Solutions for different types of citizen science projects • Toolboxes for project evaluation	• Concerns that outputs may not be sustainable after the project • Implementation relies on support from decision makers/ Governments
Opportunities	**Threats**
• Business opportunities for citizen science projects and for technical tools • Improve the functionalities of existing platforms • Expand citizen science research	• Lack of resources to establish useful metrics • Metrics should be approved by policy makers. • Fail to show the added value of the toolboxes and the recommendations

External market drivers and trends shall be envisaged as well, for which a PESTEL analysis will be very useful (see table 8). This type of analysis explores the political, economic, social, technological, environmental and legal external factors that may affect the market uptake of the MICS products and services. The factors can increase the market uptake (+), or inhibit market uptake, or some factors are still be to determined (±). The outcomes will mainly be subjective and thus the level of competition is presented on a scale of low, medium or high (see figure 2).

Table 8. PESTEL analysis

Factors	***Description***
Political	*The way the government intervenes in the economy*
Economic	*Economic growth, interest rates, exchange rates and inflation*
Social	*Cultural aspects and health awareness, population growth rate, age distribution, career attitudes and safety emphasis*
Technological	*Technological aspects such as research and development, automation, incentives for technology and the rate of technological change*
Environmental	*Environmental aspects such as weather, climate and climate change, which can affect sectors such as tourism, agriculture and insurance in particular*
Legal	*Discrimination law, consumer law, antitrust law, labour law and health and safety legislation*

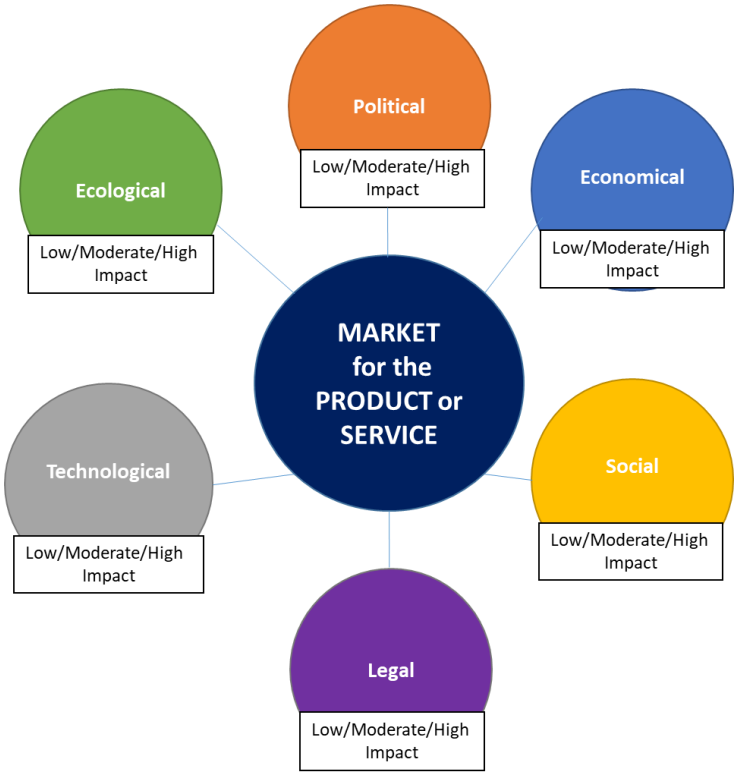

Figure 2. PESTEL analysis result

A business model canvas has been defined (see table 9), to determine revenue sources and streams for the MICS outcomes. The initial plan to reach the market together with the business expectations are summarised in the business model canvas.

Table 9. Business model canvas for MICS

<table>
<tr>
<td>Key Partners
Industry and R&D institutions that bring impact-assessment applications to the market
NGOs foundations
Educational programs, Citizen Scientist
Public agencies dealing with monitoring and managing local monitoring data
Geo/GEOSS data
Citizen scientists, ecology enthusiasts wanting to collect and provide data; technology enthusiasts wanting to become citizen scientists</td>
<td>Key activities
Co-development, maintenance and evolution of MICS’s platform and systems (Website, data, methods)
Creation of new functionalities according to end-users needs
Regular updates of data repositories (from citizen science)
Innovation activities to improve MICS performance and scope (Processing, prediction, new parameters)
Training and outreach to involve target groups of users or communities via various (Virtual or on site)
Integration into existing database to integrate data
Innovation of MICS components to extend their personality

Key resources
The MICS web-platforms
IPR: algorithm, new methods
Computer hardware: hosting servers for data
Tutorials and educational materials to support and increase awareness</td>
<td>Value propositions
Solutions allowing policy makers to access information on citizen science impact
Validation of impact through scientific protocols
Better prediction (in terms of time and cost) of citizen science impact
Framework for citizens to bottom up management of their environment</td>
<td>Customer relationships
Personalised interaction via web-system (citizens and decision makers)
Interaction with the public at specialised social fora, events, workshops and key target markets
Technical support and advice for end users of MICS

Channels
The MICS website
Awareness events, city campaigns, workshops and events</td>
<td>Customer Segments
Companies and other organisations with business activities in the impact-assessment and environment management
Administration and government authorities
Citizens concerned about the environment
In situ data companies
Educational institutes and academic bodies wanting to participate in citizen-science--based work</td>
</tr>
<tr>
<td colspan="3">Cost structure
Personnel for maintenance and evolution for MICS methods and technology
Personnel for development and innovation
Outreach
Administrative expenses
Infrastructure: MICS servers, data archiving
Protection of IPR</td>
<td colspan="2">Revenue streams
Customer fees (sponsorship)
Infrastructure as a service
Software as a service
Monitoring services
Training and consultancy services</td>
</tr>
</table>

4.3 Exploitation management

4.3.1 Knowledge and IPR management

The management of IPR is strictly ruled by the *Consortium Agreement* (CA), which includes all provisions related to the management of IPR including ownership, protection and publication of knowledge, access rights to knowledge and pre-existing know-how as well as questions of confidentiality, liability and dispute settlement.

In the CA, the Partners have identified the background knowledge included and excluded. The CA regulates the ownership of results.

The knowledge acquired in the course of the project shall be regarded as the property of the contractor who produces it, and the originator is entitled to use this right and to license it without any financial compensation to the other contributors. The CA also regulates the transfer of results ownership.

Each Signatory Party may transfer ownership of its own Foreground following the procedures of the Grant Agreement.

Each Signatory Party may identify specific third parties it intends to transfer the ownership of its Foreground to in Attachment to the CA. The other Signatory Parties hereby waive their right to prior notice and their right to object a transfer to listed third parties according to the Grant Agreement.

The transferring Party shall, however, at the time of the transfer, inform the other Parties of such transfer and shall ensure that the rights of the other Parties will not be affected by such transfer.

To respond adequately to the horizontal and sensitive issues of IPR, issues are planned as fixed points on the agendas of the StC; only upon necessity, ad-hoc committees for IPR will be established and composed by the most appropriate partners and those affected by the specific issue and its consequences:

- Debate on protectable results reported by the WP leaders or the Project Management Panel;
- Strategies of and provisions for IPR protection and sharing as well as provisions for the further use of foreground in coherence with the CoA and GrA;
- Decision upon publications and dissemination actions.

Objects for IPR management include:

- Algorithms
- New methods and toolboxes
- Collected data
- Know-how developed

4.4 Exploitation Roadmap

Once information is collected for the resulting exploitable MICS's products and services by the end of the project, enough information should be available to prepare an exploitation roadmap. This roadmap will outline a plan for short, medium and long-term goals and the activities to be undertaken to reach them, and will include the following elements:

- the markets to target and how to reach them;
- service pricing and sources of revenues;
- how to be competitive in the market;
- distribution channels, if relevant;
- organisational structures and operating partnerships;
- non-profit aspects.

The communication activities should continue beyond the end of the project and the focus of these should be to promoting the resulting outputs. The roadmap will thus also include recommendations on communication activities.

5 Data management plan (DMP)

The DMP defines:

- the handling of research data during and after the project;
- the type of data that will be collected, processed, or gathered;
- what methodology and standards will be applied;
- whether and how the data will be made (openly) accessible;
- how the data are stored.

The DMP will evolve during the lifetime of the project and will be reviewed and updated in each reporting period.

5.1 Data principles

5.1.1 FAIR principles & Open Research Data

MICS will follow the FAIR guidelines -Findable, Accessible, Interoperable and Reusable- for open research data. These guidelines describe different considerations for contemporary data publishing environments in support of manual and automated deposition, exploration, sharing and reuse. FAIR Data Management in Horizon 2020 provides for the inclusion of 1) a summary of the data collected; 2) methods to ensure that the data is FAIR; 3) resources to be allocated; 4) data security. In order to comply with the FAIR data management of Horizon 2020, all data generated during the project will be freely available via MICS's repositories, as well as all the contextual information needed to replicate the research undertaken.

5.2 Data sharing

The data collected during the project will be freely available through the MICS platform. Deliverables (D3.1-D3.5) framed within this work package will provide the necessary information on the platform development for data sharing. Specifically, D3.3 will deliver a dedicated secure storage facility for the collected data, featuring a metadata scheme for common and interoperable data documentation.

Policy briefs, recommendations and other written outputs will be uploaded to open-access platforms and repositories (Research Gate, Zenodo, research papers in economics (RePEC)); videos will be deposited on a dedicated YouTube channel, podcasts on dedicated podcast repositories, and additionally all the project outputs will be available on websites and social media channels of each of the consortium members. All the materials will additionally be available on the project website that will be kept operational by Earthwatch also after the termination of the project.

Hence, the data will be exploited under the form of "Repositories of open information" and will be made available through open access repositories such as:

- the GEOSS Data Collection of Open Resources for Everyone (Data-CORE) [www.earthobservations.org/geoss_dsp.shtml];
- the European Union Open Data Portal [https://data.europa.eu/euodp/en/data];
- the European Citizen Science repository "EU-Citizen.Science" (when available).

The most appropriate repository will be selected as soon as the project starts to gather data and metadata.

5.3 Database protection

Two types of data will be created or collected in MICS: **personal data and impact-assessment data**. Both will be collected, processed, curated and preserved following international and European standards and obeying the most recent European Directives.

Concerning personal data, to protect users' privacy, the MICS consortium will be extremely careful to apply the most recent European legislations, national laws and standards on data protection (e.g. EU GDPR).

The database protection rights will be applied through:

1. Open Data Commons Attribution License (ODC-By);
2. the MICS platform and database Terms of Service;
3. applicable national laws on copyright and databases (to be considered in licensing methods).

5.4 Data management procedure after "Brexit".

According to the section of the draft withdrawal agreement dealing with data protection (https://ec.europa.eu/commission/sites/beta-political/files/draft_withdrawal_agreement_0.pdf, November 14th 2018):

"The UK would have to continue applying European data protection standards to data coming in from the EU. The EU, for its part, would not treat personal data from the UK any differently from data obtained in the EU simply because of the UK having left.

Similarly, the agreement would bind both the EU and the UK to maintain existing levels of protection for any classified information each has obtained from the other. This would include data obtained from Euratom, which strictly speaking is not part of the EU.

The commitment on classified information means the UK would have to continue to apply many EU standards in classified public procurements and grants. The UK would also be bound to prevent the export to third countries of any cryptographic products that use classified algorithms evaluated and approved by the EU prior to the end of the transition period.

The patent, trademark and copyright systems of the UK are closely linked to the rest of the EU – and the draft agreement provides that any IP registered in Britain before the end of the Brexit transition period, 31 December 2020, will continue to be valid afterwards without any further paperwork. In most cases, those who hold IP rights under EU law will be able to get "comparable" protection under British law. The language concerning the protection of databases is somewhat stronger, requiring UK law to afford "the same level of protection" as the Database Directive of 1996".

6 Final considerations

This plan for exploitation and dissemination for the MICS project presents a strategy for the widespread dissemination of the project outputs and deliverables as well as the design of an exploitation strategy ensuring the long-term, post-grant sustainability and replicability of the outputs and the expansion of the end-user base of the MICS products and services. Expected major exploitable outputs of the MICS project have being identified, but new business proposals and opportunities could arise during the project period. Specific exploitable outputs emerging will be acknowledged and further strategies for exploitation will be envisaged when appropriate.

7 List of abbreviations

CS	*Citizen Science*
PEDR	*Plan for exploitation and dissemination*
GEOSS	*Global Earth Observation System of Systems*
CA	*Consortium agreement*
GA	*Grant agreement*
DoA	*Description of action*
PESTEL	*Political, economic, social, technological, environmental and legal*
SWOT	*Strengths, Weaknesses, Opportunities and Threats.*
DMP	*Data Management Plan*

8 References

Newton, P., (2014). What is PESTEL analysis? London: Bookboon.