Brussels, 13 April 2018

COST 033/18

DECISION

Subject: **Memorandum of Understanding for the implementation of the COST Action "Increasing understanding of alien species through citizen science" (ALIEN-CSI) CA17122**

The COST Member Countries and/or the COST Cooperating State will find attached the Memorandum of Understanding for the COST Action Increasing understanding of alien species through citizen science approved by the Committee of Senior Officials through written procedure on 13 April 2018.

MEMORANDUM OF UNDERSTANDING

For the implementation of a COST Action designated as

COST Action CA17122
INCREASING UNDERSTANDING OF ALIEN SPECIES THROUGH CITIZEN SCIENCE (ALIEN-CSI)

The COST Member Countries and/or the COST Cooperating State, accepting the present Memorandum of Understanding (MoU) wish to undertake joint activities of mutual interest and declare their common intention to participate in the COST Action (the Action), referred to above and described in the Technical Annex of this MoU.

The Action will be carried out in accordance with the set of COST Implementation Rules approved by the Committee of Senior Officials (CSO), or any new document amending or replacing them:

a. "Rules for Participation in and Implementation of COST Activities" (COST 132/14 REV2);
b. "COST Action Proposal Submission, Evaluation, Selection and Approval" (COST 133/14 REV);
c. "COST Action Management, Monitoring and Final Assessment" (COST 134/14 REV2);
d. "COST International Cooperation and Specific Organisations Participation" (COST 135/14 REV).

The main aim and objective of the Action is to Managing biological invasions depends on accurate, detailed and up-to-date information on occurrences, distribution, pathways and impact of IAS at varying spatial scales across Europe and indeed globally. We will examine the potential of citizen science (CS), involvement of volunteers within science, to inform understanding and management of Alien Species (AS).. This will be achieved through the specific objectives detailed in the Technical Annex.

The economic dimension of the activities carried out under the Action has been estimated, on the basis of information available during the planning of the Action, at EUR 60 million in 2017.

The MoU will enter into force once at least seven (7) COST Member Countries and/or COST Cooperating State have accepted it, and the corresponding Management Committee Members have been appointed, as described in the CSO Decision COST 134/14 REV2.

The COST Action will start from the date of the first Management Committee meeting and shall be implemented for a period of four (4) years, unless an extension is approved by the CSO following the procedure described in the CSO Decision COST 134/14 REV2.

OVERVIEW

Summary

There is no sign of saturation in accumulation of alien species (AS) introductions worldwide, additionally the rate of spread for some species has also been shown to be increasing. However, the challenges of gathering information on AS are recognized. Recent developments in citizen science (CS) provide an opportunity to improve data flow and knowledge on AS while ensuring effective and high quality societal engagement with the issue of IAS. Advances in technology, particularly on-line recording and smartphone apps, along with the development of social media, have revolutionized CS and increased connectivity while new and innovative analysis techniques are emerging to ensure appropriate management, visualization, interpretation and use and sharing of the data .

The Action will address multidisciplinary research questions in relation to developing and implementing CS, advancing scientific understanding of AS dynamics while informing decision-making specifically implementation of technical requirements of relevant legislation such as the EU Regulation 1143/2014 on IAS, support of the EU biodiversity goals and embedding science within society. The Action will explore and document approaches to establishing a European-wide CS AS network. It will embrace relevant innovations for data gathering and reporting to support the implementation of monitoring and surveillance measures, while ensuring benefits for society and citizens, through an AS CS European network. The Action will, therefore, increase levels of participation and quality of engagement with current CS initiatives, ensuring and evaluating educational value, and improve the value outcomes for potential users including citizens, scientists, alien species managers, policy-makers, local authorities, industry and other stakeholders.

Areas of Expertise Relevant for the Action	**Keywords**
● Biological sciences: Conservation biology, ecology, genetics ● Earth and related Environmental sciences: Databases, data mining, data curation, computational modelling ● Biological sciences: Ecology ● Biological sciences: Bioinformatics ● Educational sciences: Education: training, pedagogy, didactics	● Invasive alien species ● Biodiversity monitoring ● Public Participation ● Scientific communication ● Visualisation and analysis

Specific Objectives

To achieve the main objective described in this MoU, the following specific objectives shall be accomplished:

Research Coordination

● How to improve the IAS data collection benefiting from promising innovative approaches to CS, specifically taking account of advances in tools and technologies?

● What are the best practices in data management and standards specifically in relation to IAS, especially considering their applicability across CS data initiatives?

● What is the current quality of AS CS data? How to identify and deal with bias? What are the needs and formats for information by different user groups including European and national bodies involved in implementation of policy instruments, the scientific research community, stakeholders and stakeholder associations, and citizens?

● How to improve approaches to engage people within AS CS? Including (1) European and national bodies involved in implementation of policy instruments (2) the scientific research community, (3) stakeholder associations, and (4) citizens.

● Assess the application of CS to (I)AS (across all environmental domains) monitoring and surveillance

● Implement a Europe-wide CS network building on existing partnerships and initiatives, and aiming to create synergies across environmental/biodiversity goals that overcomes cultural and language barriers.

Capacity Building

● Increase inclusivity by establishing a network across the 36 COST Member States and Cooperating States (extending to near neighbours and international partners) to deliver the aims of the Action while enhancing skills throughout the network.

● Increase the skills and opportunities to share knowledge, innovation and experience through the Action network by including a diversity of stakeholders (academics, decision-makers, NGOs, industry, citizens and others).

● Increase opportunities for sharing experiences (mostly country-level but recognizing other scales too) and increase the capacity to network and share insights, especially in those countries in the network that need to develop new activities with respect to IAS CS.

● Increase resources to involve Early-Career Investigators (ECIs) in the Action through active participation using all the COST networking tools but also inclusion at the core of the Action Management Committee through leading roles alongside established mentors.

● Increase access to knowledge and information on AS in Europe, with relevance to the implementation of the EU Regulation on IAS, but also for the other nature protection Directives (e.g. Habitats and Birds Directives) and the EU financial programmes (e.g. LIFE, Horizon 2020, Erasmus).

TECHNICAL ANNEX

1. S&T EXCELLENCE

1.1. CHALLENGE

1.1.1. DESCRIPTION OF THE CHALLENGE (MAIN AIM)

The overarching aim of this Action will be to explore and develop the potential of citizen science (CS), the involvement of volunteers within science, in response to Alien Species (AS). Particular attention will be dedicated to Invasive Alien Species (IAS), a term used to define AS that cause harm to biodiversity and ecosystem services, or have a negative impact on the economy or human health. Managing biological invasions depends on accurate, detailed and up-to-date information on occurrences, distribution, pathways and impact of IAS at varying spatial scales across Europe and indeed globally. Effective and efficient prevention, early detection, rapid response and evaluation of the effectiveness of management measures for IAS require such information. There are a number of ways in which this information can be gathered but increasingly CS is seen as essential to ensure the spatial and temporal resolution of data capture, allowing for rapid response and the success of prevention and management programs. In addition, CS can play a significant role in public engagement, improved education and public awareness, and is recognized as fundamental to the attainment of the objectives of AS policies.

Advances in technology, particularly on-line recording and smartphone apps, along with the development of social media, have revolutionized CS and increased connectivity, while new and innovative analysis techniques are emerging to ensure appropriate management, visualization, interpretation, use and sharing of the data. For example, statistical methods have been developed to account for inherent biases within citizen science data and enable wide-ranging ecological questions to be addressed such as enhanced understanding of IAS impacts leading to prioritization and rapid response. However, despite these developments the European CS AS landscape is fragmented in terms of geographic engagement/projects, suitability and application of available tools, quality of practices, data accessibility/sharing and data uses.

Through this COST Action we propose to: i) establish a European-wide CS AS network with the goal of fostering collaboration to increase data gathering capacity and exchange of information on AS; ii) increase levels of participation, educational value and relevance of existing CS initiatives to ensure significance of outcomes (including AS education and action) for all stakeholders (i.e. citizens, scientists, alien species managers, policy-makers, local authorities, industry, schools and other stakeholders); iii) develop methods to improve the CS data quality and appropriate methods of visualization to engage and communicate with all interested stakeholders; iv) analyse the data to improve the understanding of biological invasions while improving implementation of relevant measures to address the challenges and threats to biodiversity, society (including food security and health risks), and economies posed by IAS, and v) ensure communication and dissemination of results providing evidence to stakeholders engaged in the implementation of the EU Regulation on IAS (1143/2014), particularly in relation to monitoring and surveillance schemes.

1.1.2. RELEVANCE AND TIMELINESS

There is no sign of saturation in the accumulation of AS introductions worldwide, additionally the rate of spread for some species has been shown to be increasing. In recognition of the growing threat of IAS

to biodiversity, health and economies the EU has recently adopted a Regulation on IAS (1143/2014) which focuses on prevention as the most desirable approach to managing IAS. However, the challenges of gathering information on AS are recognized (and have been the focus of a recently completed COST Action TD1209). Recent developments in CS ensure the relevance and timeliness of this approach as an opportunity to improve data flow and knowledge on AS while ensuring effective and high quality societal engagement with the issue of IAS. The Action will address multidisciplinary research questions in relation to developing and implementing CS, advancing scientific understanding of AS dynamics while informing decision-making, specifically addressing technical requirements of the EU Regulation on IAS, support of the EU biodiversity goals, and embedding science within society. The Action will explore and document approaches to establishing a European-wide CS AS network.

There is an opportunity to ensure collaboration and coherence among emerging AS CS initiatives which are developing rapidly in some countries, and extend AS CS initiatives to countries where these are less developed. There is a need for increased connectivity and networking to maximise benefits to citizens, including education, while ensuring the uptake of the data to inform action and decision-making across Europe. Furthermore, it is extremely timely to raise the profile of AS CS with policy-makers who may be reluctant to use CS data but are increasingly recognizing the opportunity of making science more relevant to people and society while leveraging large datasets. Indeed the Action also has the potential to contribute to the Juncker's Commission priorities such as the "Digital Single Market" and "Democratic Change", especially through Better Regulation. Under its commitment to Better Regulation, the Commission undertook a "Fitness Check" of the Nature Directives, which concluded that there is a need to improve the effectiveness and efficiency of their implementation by working in partnership with different stakeholder communities in Member States and across the EU to deliver results. The resulting Action Plan for nature, people and the economy {SWD(2017) 139 final} presented in the Communication of the Commission {COM(2017)198 final} and relevant accompanying material) acknowledges that nature protection can benefit from engaging citizens in the implementation of environmental legislation, and advocate to improve synergies while implementing these policies, e.g. the EU Regulation on IAS. Indeed the Action Plan for nature, people and the economy {SWD(2017) 139 final} provides a timely opportunity to engage young people through the European Solidarity Corps (launched by the EC in 2016) by providing activities (monitoring of species and habitats, ecological restoration activities, identification and eradication of invasive alien species, etc.) relevant to nature protection in Natura 2000 sites. Therefore, the aims of this Action are aligned with Priority D: Better communication and outreach, engaging citizens, stakeholders and communities.

In summary, there has been considerable enthusiasm around the use of CS for investigating AS. However, there is a lack of cohesion between initiatives and limited sharing of good practice within countries but also regionally and across Europe. The poor interconnectivity between networks, and projects within them, is causing confusion not only with citizens, who may not see a clear route to participation, but also the many potential end-users. There is a clear need to move forward in an informed and inclusive way to tackle IAS related issues. CS approaches provide exciting opportunities for meeting this need while deeply engaging diverse stakeholders.

1.2. OBJECTIVES

1.2.1. RESEARCH COORDINATION OBJECTIVES

The overarching aim of this Action will be to maximize the potential of AS CS to meet scientific and policy needs while improving the experience of participating citizens through effective engagement and knowledge exchange.

The Action will achieve the following Research Coordination Objectives:

I. How to improve the IAS data collection benefiting from promising innovative approaches to CS, specifically taking account of advances in tools and technologies?
II. What are the best practices in data management and standards specifically in relation to IAS, especially considering their applicability across CS data initiatives?
III. What is the current quality of AS CS data? How to identify and deal with bias? What are the needs and formats for information by different user groups including European and national bodies involved in implementation of policy instruments, the scientific research community, stakeholders and stakeholder associations, and citizens?

IV. How to improve approaches to engage people within AS CS? Including (1) European and national bodies involved in implementation of policy instruments (2) the scientific research community, (3) stakeholder associations, and (4) citizens. The Action will specifically consider motivation but also ways to ensure uptake by different user groups acknowledging cultural differences both within Member States and across Europe bridging the gaps between countries and regions with differing legacies of expertise in CS.

V. Assess the application of CS to (I)AS (across all environmental domains) monitoring and surveillance

VI. Implement a Europe-wide CS network building on existing partnerships and initiatives, and aiming to create synergies across environmental/biodiversity goals that overcomes cultural and language barriers.

The activities, using COST networking tools, employed to achieve the Research Coordination Objectives, will lead to key outcomes and associated deliverables (see GANTT Chart for timeline):

- Interactive guide on best practices for AS CS focusing on approaches to CS alongside relevant tools and technologies (with provision for updating as new tools emerge but including horizon scanning for relevant new technologies) and underpinned by semi-systematic reviews published within peer-review (open access) journals.
- Review of best practice in data management and standards, specifically in relation to AS CS data but with applicability across CS data initiatives, linking to existing data standards authorities and networks such as Darwin Core.
- Recommendations on design of CS initiatives to enable effective application of analysis methods, accounting for potential bias within CS data and recognizing the needs and formats for information by different user groups. Specifically the Action will develop on-line tools delivered through existing platforms such as ZOON (https://mran.revolutionanalytics.com/package/zoon/) alongside a gallery of exemplary data visualizations.
- Document methods, through case studies, of engaging people with CS and specifically review motivation for participation, acknowledging cultural differences both within Member States and across Europe, and accounting for different user groups (1) European and national bodies involved in implementation of policy instruments (2) the scientific research community, (3) stakeholder associations, and (4) citizens.
- A coherent and coordinated European-wide CS initiative for monitoring IAS linking with existing projects, networks and partnerships, creating synergies across environmental/biodiversity goals including the development and implementation of a distributed networking approach that addresses cultural and language barriers.

1.2.2. CAPACITY-BUILDING OBJECTIVES

Engagement in AS CS varies significantly across Europe. The COST Action CS-EU (CA15212) “Citizen Science to promote creativity, scientific literacy, and innovation throughout Europe” recognizes that engagement and expertise in CS varies across the European Research Area “with some countries with strong levels of activity and networking and some with much lower levels”. The Action will pursue the following Capacity-building Objectives:

I. Increase inclusivity by establishing a network across the 36 COST Member States and Cooperating States (extending to near neighbours and international partners) to deliver the aims of the Action while enhancing skills throughout the network. ITCs will be included throughout the Action including through leadership of WGs and associated activities (including hosting). The Action will specifically collaborate with the CS-communities already active in the fields of AS and biodiversity.

II. Increase the skills and opportunities to share knowledge, innovation and experience through the Action network by including a diversity of stakeholders (academics, decision-makers, NGOs, industry, citizens and others). The Action will build on the experience from previous COST Actions relating to AS including TD1209 ALIEN Challenge and ES1304 ParrotNET, and will link with the current COST Action CS-EU (CA15212) including potential cross-Action activities.

III. Increase opportunities for sharing experiences (mostly country-level but recognizing other scales too) and increase the capacity to network and share insights, especially in those countries in the network that need to develop new activities with respect to IAS CS.
IV. Increase resources to involve Early-Career Investigators (ECIs) in the Action through active participation using all the COST networking tools but also inclusion at the core of the Action Management Committee through leading roles alongside established mentors (also supporting the European Solidarity Corps).
V. Increase access to knowledge and information on AS in Europe, with relevance to the implementation of the EU Regulation on IAS, but also for the other nature protection Directives (e.g. Habitats and Birds Directives) and the EU financial programmes (e.g. LIFE, Horizon 2020, Erasmus). Another important contribution would be through the development of indicators on public perception of problem (response action).

The activities, using COST networking tools, employed to achieve the capacity-building objectives, will lead to key outcomes and associated deliverables:

- Collaboratively and inclusively document research priorities (and skills gaps) across the Action network and create opportunities to develop collaborative research projects in response to EU funding sources.
- Drawing on expertise within CS-communities already active in the fields of AS and biodiversity address skills gaps through Short-Term Scientific Missions (>20 across the four years), training schools (four across the four years) and focused interactive workshops (six across the four years) maximizing opportunities for Early Career Investigators (ECIs) but also ensuring access to all participants.
- Invite stakeholders (academics, decision-makers, NGOs, industry, citizens and others) to two dissemination events to share knowledge, innovation and experience on AS in Europe.
- Mentor ECIs in leadership through inclusion at the core of the Action Management Committee in roles alongside established mentors.

1.3. PROGRESS BEYOND THE STATE-OF-THE-ART AND INNOVATION POTENTIAL

1.3.1. DESCRIPTION OF THE STATE-OF-THE-ART

CS, the involvement of volunteers in the scientific process, has a long history extending over hundreds of years primarily through biological recording (essentially spatial and temporal occurrence of species documented by enthusiasts). New technologies have revolutionized CS and increased the potential for access by many more people than have traditionally been involved. Additionally advances in data management, in analysis and in innovative visualization of results have rapidly progressed, providing opportunities to ensure effective and imaginative use of CS data . Social online media are proving important to monitoring, prediction and modelling of trends and patterns in a broad range of environmental domains. The pervasiveness of mobile devices with cameras combined with a broad set of social media channels provides great potential for real-time observations of ecologically relevant information that can be contributed with ease.

Concurrently there has been increasing recognition of the threat posed by IAS and the need for accurate and timely-provided information for prioritization and management. The EU Regulation on IAS reflects this through a focus on prevention via effective surveillance and monitoring referring to volunteer participation (including citizen science, public awareness and education) in decision-making. CS provides a mechanism to achieve this outcome. Although AS information, including data on occurrence of species, has been contributed by professionals including academics and governmental employees, it is acknowledged that there is potential to widen participation through involvement of volunteers in CS initiatives. Concerns that the quality of information gathered by volunteers rather than professionals would be inferior are beginning to abate and focus has shifted to consideration of approaches to maximize engagement and utility of the data for early-warning, containment and monitoring spread. However, it is still important to acknowledge and reconcile ongoing and emerging issues such intellectual property rights, legal complications and biases within the data.

Specifically national, regional, and international networks are emerging and embracing different topics and approaches. As examples, the European CS Association, counterparts at national levels (e.g. in

Spain or Germany), the CS Task Force of the European Network of Environmental Protection Agencies, the European Commission 'Environmental Knowledge Community' CS Innovation Project, a COST Action dedicated to Citizen Science (CA15212), clusters of EU-funded projects such as the Citizens Observatories, etc. Concurrently, consideration is being given to documenting quality and standards exists for different components (INSPIRE for public authorities, OGC for geospatial information, Darwin Core for biodiversity records, etc.); however, since the data is so spatially biased, with some regions having a plethora of distribution data and others none, their usefulness is limited and there is scope for drastic improvement and guidance.

1.3.2. PROGRESS BEYOND THE STATE-OF-THE-ART

The Action will ensure progress beyond the state-of-the-art by implementing the recommendations from the expert workshop "Citizen Science and Open Data: a model for Invasive Alien Species in Europe" https://riojournal.com/article/14811/), building on previous COST Action successes (e.g. TD1209 ALIEN Challenge), and linking with current relevant Actions (e.g. CA15212 CS-EU, CA16229 ENEC), with the primary aims of adopting and developing innovative approaches and best practice at all stages of the CS IAS data cycle. The Action will be dedicated to the theme of AS CS and so will provide depth to complement the breadth of other Actions (such as CA15212).

Interconnecting and extending existing networks will provide possibilities to address the particular challenges related to the gathering and sharing of AS information. Furthermore, the experiences and expertise that partners will bring to the Action will be from multidisciplinary perspectives. There is a need to extend the networks to encompass not only CS practitioners and scientists but also citizens and end-users. Typically CS has been most prominent in northern European countries but there is critical need, urgency and motivation to extend the reach across Europe.

Providing best practice guidelines and knowledge exchange, including data mobilization, integration and use in the area of IAS. The development of inclusive data standards through extensive consultation and ultimately consensus will address concerns and criticisms on the quality and utility of CS data which is often assumed not to be fit-for-purpose.

Developing methods and providing guidelines to improve data quality and quality of the science outcomes, distinguishing between accuracy of the data point, information content of the data set, and appropriate analysis to gain derived information from the data set and including issues of data bias and data management (including visualization).

Providing a framework for tools and data governance from different CS projects, upon which the dynamic and diverse fields of IAS data and information technology can be structured. It is all too easy for tools and standards to diverge when their developers work in isolation, without clear community guidance. The Action's work will help standards and common tools to evolve and keep pace with the state of the art. The Action will support the interoperability of biodiversity and environmental data, particularly those data being collected in new and innovative ways, where tools and standards need to keep pace with these changes. The Action will provide an overview of the existing AS CS landscape by evaluating existing initiatives to understand the commonalities in methods and goals, in addition to the knowledge and skills gaps that can be addressed or need further exploration. Existing communities also have traditional tools, workflows and data standards. The Action will work with these communities to improve interoperability, for example, by mapping traditional terms onto international standards. Our framework will have to acknowledge and incorporate these traditional ways of working while providing routes to better international and cross-taxonomic integration.

There is considerable potential to collaborate on IT infrastructure to avoid duplication and foster re-use. Examples of open collaborative resources that have been used in CS projects include OpenStreetMap and Quantum GIS, but also application program interfaces, such as those provided by the Global Biodiversity Information Facility and Catalogue of Life. Often, CS is only part of a research portfolio used by biologists, therefore it is essential that tools are provided on a plug-and-play basis, already conforming to community standards and sufficiently configurable to allow for innovation.

The Action's framework will acknowledge and leverage the cultural differences and the multilingual communities of Europe. The Action will benefit from its diverse and multidisciplinary capacity, combining experiences in order to develop best practice guidelines, including better and more inclusive

standards. Some CS groups have successfully leveraged social media such as Facebook and Twitter. Such tools can be used for teaching, outreach and communication, but they can also be used as an indication of public perception and mood. Guidelines are needed to make the most of the opportunities of social media, particularly as this relates to the specific circumstances of biodiversity, IAS management and CS.

The Action will inform international organisations who provide standards useful to biodiversity and CS. It will provide knowledge exchange in subjects, such as data mobilization, integration and use in the area of AS. The participation of ECIs from the Action in data governance is an essential element to the long-term sustainability of standards organizations and facilitating the two-way flow of information from the users of tools and data to their creators. The Action will also be able to create expertise and guidelines relevant to other thematic areas that want to understand and apply CS as part of their research and outreach.

1.3.3. INNOVATION IN TACKLING THE CHALLENGE

The Action will connect expertise on biological invasions, CS and data management across Europe in order to address policy relevant challenges and raise the profile of CS and AS. This Action will provide coordination through networking opportunities to existing activities while extending CS to regions where initiatives are lacking through shared infrastructures and increasing skills through training schools and STSMs across the Action network. The emerging tools and technologies not only add to the timeliness of this Action but also provide exciting opportunities for testing within the framework of AS. Good practice and innovative examples of using CS to address IAS will be collated and made visible across Europe through the Action website but also active dissemination of the information through various approaches including webinars and development of new training materials. The importance of interoperability and data standards will be at the core of the Action and new products will be developed that provide updates in relation to this in accessible formats. More generally the Action will ensure the relevance of science to people, connecting them with the processes that lead to evidence that informs science and ultimately decision-making within countries and across continents. The potential to empower citizens within democratic participatory science and decision-making within complex areas such as conservation, land management, trade and pest management will ensure social and scientific innovations and breakthroughs.

1.4. ADDED VALUE OF NETWORKING

1.4.1. IN RELATION TO THE CHALLENGE

AS observe no administrative borders and need to be addressed through concerted action on a large spatial scale. The contributions of citizens to a sound knowledge base of AS traits (e.g. distribution, pathways, impact) is deemed crucial. However, the current landscape of AS CS initiatives is heterogeneous and fragmented. Cross-border cooperation and networking to share knowledge, leverage and extend the capacity to collect, share and analyse CS data is essential (specified within the EU Regulation on IAS). This should ensure a contribution of CS to the effective assessment and management of biological invasions building on enhanced understanding and trust of CS data.

1.4.2. IN RELATION TO EXISTING EFFORTS AT EUROPEAN AND/OR INTERNATIONAL LEVEL

Using CS for continental wide AS research has numerous advantages, but the potential for sustained initiatives providing detailed observations over long-time and large spatial scales is exceptional. By coordinating current CS networks and supporting the building of new national and regional networks we will build capabilities and capacity. Furthermore, by encouraging participation on AS research we will galvanise effort towards a common goal, rather than more haphazard data collection that, while interesting, is less useful from a scientific point of view.

The network, including academics and citizen scientists, will offer many opportunities for social innovation, particular encouraging young people to participate in conservation and science, but also connecting generations, by linking the scientific education of the young with the traditional knowledge of older generations will ensure unique and complementary perspectives on AS are shared. The transdisciplinary nature of the Action will enable us to bring new ideas to problems of IAS and help us reach a broader range of stakeholders. By linking applied conservation researchers with social

scientists, user experience specialists, software engineers and societies we will learn the needs of each other and produce better outcomes. For example, software that is not successful might fail attract participants due to a misunderstanding of their needs, while even successful software, from a participant's perspective, may fail from a scientific standpoint by collecting the wrong sort of data or in the wrong format.

2. IMPACT

2.1. EXPECTED IMPACT

2.1.1. SHORT-TERM AND LONG-TERM SCIENTIFIC, TECHNOLOGICAL, AND/OR SOCIOECONOMIC IMPACTS

In the **short-term** (within the timeframe of the COST action), our collaboration will help to mobilize AS information, provide and report on current trends for AS, support the implementation of the EU Regulation on IAS, raise public awareness, create new opportunities for ECIs, and stimulate discussions with diverse stakeholder groups (including citizens) through online tools but also face-to-face events about the related challenges.

In the **medium-term** (in the years after the action is completed), scientists and society will benefit from an increase and more timely availability of AS information. This will be complemented by benefits for policy-makers with provision of a better evidence-base for decision- making contributing to improved management of IAS/AS and consequently decreased ecological and- socio economic impacts of IAS leading to long-term benefits for biodiversity. Concurrently, we anticipate a cultural shift across sectors to accept and increasingly include CS activities as an integral part of meeting research and policy objectives, and approaches will be standardized in a way that results are easy to compare and integrate. Ultimately contributing to better management of IAS and consequently decrease their ecological and socio-economic impacts.

In the **long-term** similar approaches will emerge in other fields, and scientific literacy in Europe will increase. This network will allow communication, exchange of ideas, and feedback between the groups involved, and lead to improved management and policy for IAS across Europe.

The high impact outcomes anticipated from these Research Coordination Objectives include:

- Improved quality and accessibility to IAS/AS CS data in Europe
- Development of a clear route to facilitate citizen participation
- Development of guidelines for the end-users of CS data and information
- Developing innovative approaches and best practice at all stages of the CS IAS data cycle
- Establishment of an European CS base monitoring network on IAS

2.2. MEASURES TO MAXIMISE IMPACT

2.2.1. PLAN FOR INVOLVING THE MOST RELEVANT STAKEHOLDERS

The Action will ensure strategic outreach through a detailed dissemination plan aimed at a range of relevant stakeholders including policy-makers and implementers, including national agencies; researchers and associated funding bodies; charities and NGOs such as wildlife groups but also botanic gardens and museums; industry, educational establishments, CS associations. Participating volunteers (citizens) will be major stakeholders and the Action will engage many people and aim for inclusiveness in terms of age, ethnicity and gender, but demography and background.

The aims of CS includes at its core excellent engagement, and as such impact is inherent. CS will contribute to greater literacy across society on biological invasions which is crucial for tackling this global environmental issue. Some of the technological tools, such as smartphone applications or social media, are indeed used to interact with recorders. For instance, through dedicated smartphone applications for IAS recording, awareness raising can be achieved with certain groups of society (e.g. anglers, gardeners, beekeepers, hunters, farmers, environmentalists) that encounter IAS. The adopted EU

Regulation on IAS envisages surveillance systems for IAS of Union concern (currently 49 species) to include both targeted and general surveys and to benefit from the involvement of different sectors and stakeholders, including regional and local communities.

2.2.2. DISSEMINATION AND/OR EXPLOITATION PLAN

A detailed dissemination plan will be developed at the beginning of the Action according to COST guidelines which will expand upon the overview of dissemination outlined here. This plan will be an active document maintained by the MC to align with the Action's aims and specific deliverables. Given the wide range of stakeholders we will ensure there are both targeted and general dissemination activities. Some examples of the groups we will target and the approaches we will use are outlined below.

We will engage **citizens** in a number of ways, including through social media, along with articles in popular magazines and in the newsletters of relevant charities and NGOs such as the Royal Society for the Protection of Birds and similar organisations that are currently deploying CS. We will be able to give examples of best practice regarding the collection of data, but also encourage participation, by explaining the need for data and the need for biodiversity conservation. We will also provide opportunities for face-to-face discussions at science festivals and other organised events across Europe.

Peer-reviewed scientific journals will be used to communicate outcomes relevant to **researchers and funding bodies**. We will select journals on the basis of ensuring ease of accessibility globally and high impact to the scientific community. We will also work with publishers to find effective dissemination methods, such as creating special issues of journals or collections of related articles. Furthermore, we will maintain a blog and issue press releases as appropriate throughout the Action.

To communicate our outcomes to **policy-makers** we will engage with key organizations globally, such as IPBES, but also continentally and nationally including non-native species secretariats and NGOs. This will take the form of policy briefs, but also providing scientific expert opinion to green papers of the EU. At a regional level we will invite local decision-makers to participate in our events in providing opportunities for interactive engagement. Such communications will also consider the needs of **research agencies and funding institutions**, collaboratively highlighting where research is needed and areas where research funding will produce the greatest value outcomes.

Short-term Scientific Missions, hackathons and other collaborative meetings will foster interactions and cross-Action projects. They will link different types of **research**, **industry** and **citizen groups**, finding common goals, novel applications and solutions.

Social media will be used as a **general dissemination** platform with cross-Action scope. It will be used for rapid communication and advertisement of events. Social media will also be a way to reach other interested groups who were not considered in the initial stages based on their response. It will be particularly important for two-way communication between the Action and stakeholders, providing access to community networks.

2.3. POTENTIAL FOR INNOVATION VERSUS RISK LEVEL

2.3.1. POTENTIAL FOR SCIENTIFIC, TECHNOLOGICAL AND/OR SOCIOECONOMIC INNOVATION BREAKTHROUGHS

This Action will bring together citizens and scientists linking to relevant end-users across Europe to find solutions to the threat of IAS recognized as a major environmental challenge across the globalized world. By getting involved with AS, CS initiatives will provide the opportunity for excellent engagement, specifically highlighting the challenges of IAS policy and management options. We will actively foster, connect and develop CS that involves people from across diverse communities in the scientific process. We recognise the rich legacy of volunteer involvement biodiversity monitoring across Europe while acknowledging that the level of activity has not been uniform across Member States. Thus, there is considerable potential for sharing innovations while considering cultural differences and resource constraints within and between Member States. The risk of low levels of participation will be offset

through ensuring relevance of initiatives while considering approaches to inclusivity (indeed WG1 will focus on ways to engage people and WG2 on novel approaches so further decreasing this risk). Guidance on designing projects that make the participant think about the issues and outcomes that support human and environmental needs will be provided. We will also promote inclusive projects that are accessible to all and suitable for a wide age range and a diversity of cultural backgrounds.

Novel digital tools are increasing the amount and quality of CS data on IAS. These include data and image mining from social media and the use of improved analysis methods such as geographic information systems, spatio-temporal analysis, and sentiment analysis. The tools with which they can be applied are changing rapidly, from smartphones to other types of wearable crowdsourcing tools, such as those to interpret images from wildlife cameras, are increasingly used to reach a wider audience on IAS and to involve citizens in recording them as sensors. Apart from tools that foster mass participation, more complex technologies are available, including, sensors, augmented reality, drones and image recognition that require dedicated training. Collectively, these technologies have the potential to engage broad audiences, motivate volunteers, improve data collection, control data quality, corroborate model results and increase the speed of decision-making while reducing uncertainties.

The current explosion of digital technologies provides many opportunities, but also challenges to the IAS community. Real-time recording and rapid validation procedures, proper data management and swift data mobilization are indispensable to this aim (see WG3). Additionally, invasion and impact monitoring require more diverse data capture and next generation geospatial information infrastructures.

3. IMPLEMENTATION

3.1. DESCRIPTION OF THE WORK PLAN

3.1.1. DESCRIPTION OF WORKING GROUPS

The Action will focus on five interlinked working groups with four being coherently organized around the data life cycle and the fifth providing an opportunity to demonstrate developments and innovations emerging from the others. WG activities will be organized to ensure integration across WGs comprehensively using the COST networking tools to deliver an effective but flexible work programme. ECIs will be involved in the organization and implementation of the WG activities including devising programs, chairing sessions and leading outputs and deliverables with support and mentoring, as required, from other members of the Action. Activities organized in Member States designated as Inclusiveness Countries will be prioritized with the aim of widening participation and showcasing expertise across Europe.

WG1: Engaging people in CS: from participants to policy-makers will review the ways in which different CS initiatives engage target audiences, recognizing the diversity of contributors and end-users. There will be focus on engaging end-users and ultimately policy-makers with the aim of producing results that are accepted and used not only at scientific levels, but also at management and policy levels.

- **Task 1:** Develop a database of existing initiatives/approaches/activities/strategies used to engage citizens with AS from across Europe and link to distributed network that overcomes cultural and language barriers ultimately developing a glossary of terms (translated into major European languages) and key concepts relevant to CS and AS contexts.
- **Task 2:** Critically review the needs and motivations of citizens and end-users within the context of AS CS, involving scientists and social scientists to consider attitudes towards AS, CS and the connections between the two themes. Identify spatial biases in the degree of CS involvement across Europe and consider cultural and language barriers.

Deliverable

1. Database of AS-related CS (Task 1)
2. Review of needs, motivations and attitudes towards AS and CS (Task 2)
3. “Best Practice Guide to CS and Alien Species” translated into different languages and focusing on how to engage different stakeholders, including the best approaches/activities/strategies for each target-group (Task 1 and 2)

WG2: Approaches to CS: embracing innovative advances in tools and technology will explore the value of new and emerging technologies for CS in the context of AS recognizing the contribution of volunteers. The growth in AS datasets has been fostered by technological developments such as social media, apps, low-cost sensors, search engines and predictive analytics. These technological developments, an increased attention to CS and a cultural change towards collaboration and openness in research within the policy agenda (https://ec.europa.eu/digital-single-market/en/open-science), will lead to a further increase of the contribution of volunteer recorders.

- **Task 1:** Horizon scan novel technologies for CS
- **Task 2:** Explore novel ways to increase the level of participation in AS related CS (e.g. from occurrence reporting to impact monitoring) and to reach non-traditional audiences of citizen scientists (linking to WG 1; Task 2).
- **Task 3:** Critically review and document opportunities to ensure openness of app data, app code etc. e.g. through the EU CS platform under development within the JRC.

Deliverable

1. Review of new and emerging technologies with relevance to CS in the context of AS (Task 1).
2. Develop new functionalities for existing apps (e.g. gamification, scraping social media for pathways, trade and occurrence data) through a Hackathon involving citizen scientists and app developers (Task 2).
3. Guidance and best practice on openness of app data, app code etc. (Task 3; Linking to WG1; Task 1)

WG3: Data management and standards: informing best practice will develop guidance and associated training to improve the quantity, quality and usability of AS data collected by citizens. Data standards do exist, such as Darwin Core and ABCD, but their adoption is not universal and these standards need development to make them more appropriate for the breadth of data that are collected on biodiversity by citizen scientists. This includes data terms that are largely specific to IAS, such as management methods and impacts, but also ways to describe methods used by citizens. Data management is fundamental to the success and long-term impact of a CS project, yet it is often not considered until the end of the project, by which time decisions made at the beginning of the project can limit the choices for data reuse. From the outset of the Action we will create a data management plan collaboratively to guide our work recognizing IAS data, and their uses, are not identical to other biodiversity data. The need for rapid and focused data mobilization is particularly important for a response to new species introductions. This is where we will address issues of sensitive data and data sharing.

- **Task 1:** Review structure of data across existing AS CS initiatives within Europe and develop a data management plan for the Action to cover any data and other outputs from the project.
- **Task 2:** Facilitate data mobilization across Europe, particularly of Biodiversity data as that relates to AS, including linking ECIs in short-term scientific missions with experienced data managers to facilitate data publication.
- **Task 3:** Explore creative ways to illustrate the problem of IAS through novel visualizations of data and innovative mash-ups of data from different domains (linking to WG4).
- **Task 4:** Work with international data standards organizations to improve their standards for research with CS and IAS.

Deliverable

1. Published data management plan on-line including standards to be used, the terms for data sharing and the long-term preservation of data (Task 1).
2. Map data flow of AS CS data across Europe linking to EASIN (Task 2).
3. Showcase of data visualization approaches through the Action website (Task 3; linking to WG4).
4. Guidance document for best practice on data management for CS specifically related to IAS (Task 4; Linking to WG1).

WG4: Analysis and visualisation: ensuring the best use of CS data will consider methods for maximising the use of CS data in the context of AS. CS provides a powerful approach to collating large-scale and long-term information critical for understanding biological invasions and informing decision-

making. However, since information is gathered by volunteers, often at places and times convenient to them, this can lead to biases in sampling, leading to multi-dimensional (spatial, temporal, or data quality) data biases. WG4 will consider approaches to address such biases and ensure maximum utility of the data and effective communication of outputs to all relevant end-users through using cutting-edge analytical tools and creative visualisation.

- **Task 1:** Review current methods of analysis and how these are appropriate to different CS datasets and different purposes (unstructured vs. structured monitoring; experimental designs (e.g. adapting BACI experimental design for CS), presence-only, presence-absence, sessile organisms (plants, leaf miners etc) vs. motile animals. Developing recommendations for standards for data collection, preparation and analysis, and identifying best practice examples for scientific uses.
- **Task 2:** Explore strengths and limits of methods used for managing different kinds of CS data to provide relevant information for end-users. This include the i) testing of different proxies for recording intensity (e.g. using co-variates, applying self-learning algorithms), ii) testing tools for data quality (e.g. assessor self-rating rules, groups assessment tools), iii) identification of uncertainties (spatial, temporal), and iv) testing of proxies for recording likelihoods as a function of the novelty of a record (to account for the fact that abundant AS are less likely to be reported than emerging ones).
- **Task 3:** Explore creative ways to analyze and illustrate the data gathered in CS to inform the public and decision makers effectively. This includes using real-time data and output visualization tools and innovative mashups of data from different domains (linking to WG3) that allow to rapidly report AS, and that provide additional relevant information (e.g. level of uncertainty). We will review existing analytical and data presentation and visualization tools and identify emerging tools and developments.

Deliverable

1. Published review on current methods of analysis and how these are appropriate to different CS datasets and different purposes (Task 1).
2. Publication (opinion or review piece) on strengths and limits of methods used for managing different kinds of CS data to provide relevant information for end-users (Task 2).
3. Guidance document on best practice in analysing and illustrating the data gathered in CS to inform the public and decision makers effectively (Task 3).

WG5: Cross-cutting CS initiative(s) for IAS across Europe will (1) coordinate and facilitate the flow of information among WG1-4 to efficiently maximize the impact of the Action across Europe and beyond, and (2) showcase case studies of CS initiatives with the aim of testing the best practice guidelines developed in WG1-4. The main objective of this WG will be leveraging and expanding the existing IAS-focused networks and activities in Europe that will be included so as to represent diverse CS approaches.

- **Task 1:** Consolidate best practices and mobilize the information emerging from WG1-4.
    - Actively mobilizing the deliverables among WGs to enhance a timely use of the information created by them (e.g. Task 3 of WG3 linked to WG4)
    - Showcase CS initiatives (e.g. Deliverable 1 and 3 of WG1) and establish coordination of existing networks that will be selected as cross-cutting case studies.
- **Task 2:** Support practitioners and facilitate cross-border research and cooperation to further develop the potential of BioBlitz to engage people in CS while mobilizing IAS data including collaboration with ECSA and the Horizon 2020 project DITOs,
    - Increase understanding of how to enhance the potential of BioBlitz events as repeat monitoring events for IAS (from recommendations of the DITOs policy brief #1). The versatility of BioBlitz events provides the opportunity to test applicability of best practice guidelines for different CS approaches
    - Develop training materials for running BioBlitz events to maximize utility for gathering IAS information specifically in relation to the IAS of EU Concern documented within EU Regulation1143/2014 on IAS.
- **Task 3:** Develop and launch a showcase European CS initiative, building on existing activities and networks, in order to test best practices developed in WG1-4.

Deliverable

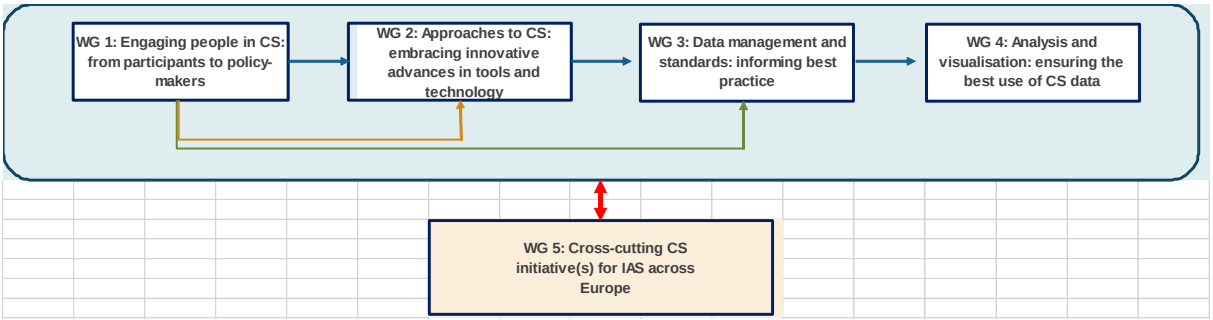
1. Documentation on the links between outputs (Deliverables) of WG1-4, emphasizing how information among WGs has been shared to maximise the impact of the Action (Task 1a and Task 1b)
2. Manuscript documenting evaluation of case studies based on guidelines developed in WG1-4. Outcomes used to inform development of training materials and guidance document for running BioBlitz events focused on IAS (Task 2a and 2b).
3. Cross-cutting European CS activity (Task 3)

3.1.2. GANTT DIAGRAM

	PERIODS														
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
WG 1: Engaging people in CS: from participants to policy-makers																
T 1.1: Develop a database of existing initiatives																
D 1.1: Database of IAS-related CS			X													
T 1.2: Critically review the needs and motivations of citizens and end-users within the context of IAS CS																
D 1.2: Review of needs, motivations and attitudes towards IAS and CS								X								
D1.3: "Best Practice Guide to CS and Alien Species"													X			
WG 2: Approaches to CS: embracing innovative advances in tools and technology																
T 2.1: Horizon scan novel technologies for CS																
D 2.1: Review of new and emerging technologies with relevance to CS in the context of AS			X													
T 2.2: Explore novel ways to increase the level of participation in AS related CS																
D 2.2: Develop new functionalities for existing apps												X				
T 2.3: Critically review and document opportunities to ensure openness of app data																
D 2.3: Guidance and best practice on openness of app data									X							
WG 3: Data management and standards: informing best practice																
T 3.1: Review structure of data across existing AS CS initiatives and develop a data management plan																
D 3.1: Published data management plan on-line			X													
T 3.2: Facilitate data mobilization across Europe																
D 3.2: Map data flow of alien species AS data across Europe linking to EASIN						X										
T 3.3: Explore creative ways to illustrate the problem of IAS																
D 3.3: Showcase of data visualization approaches through the Action website											X					
T 3.4: Work with international data standards organizations to improve their standards for research with CS and IAS																
D 3.4: Guidance document for best practice on data management for CS specifically related to IAS												X				
WG 4: Analysis and visualisation: ensuring the best use of CS data																
T 4.1: Review current methods of analysis																
D 4.1: Published review on current methods of analysis				X												
T 4.2: Explore strengths and limits of methods used for managing different kinds of CS data																
D 4.2: Publication (opinion or review piece) on strengths and limits of methods							X									
T 4.3: Explore creative ways to analyze and illustrate the data gathered in CS																
D 4.3: Guidance document on best practice in analyzing and illustrating the data gathered in CS												X				
WG 5: Cross-cutting CS initiative(s) for IAS across Europe																
T5.1: Consolidate best practices and mobilize the information emerging from WG1-4																
T 5.1a: Actively mobilizing the deliverables among WGs																
T 5.1b: Showcase CS initiatives and establish coordination of existing networks																
D 5.1 Critical summary of guidelines of WG1-4															X	
T5.2: Support practitioners and facilitate cross-border research and cooperation																
T 5.2a: Increase understanding of how to enhance the potential of BioBlitz events																
T 5.2b: Develop training materials for running BioBlitz events																
D 5.2: Manuscript documenting evaluation of case studies											X					
T 5.3: Develop and launch a showcase European CS initiative																
D 5.3: Cross-cutting European CS activity														X		

	PERIODS															
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
Kick-off meeting	X															
Website																X
MC Meeting			X			X			X			X			X	
SC Meeting			X			X			X			X			X	
Research workshops			X			X			X			X			X	
Interactive Seminars for Stakeholders																
WG1 Meeting			X			X			X			X			X	
WG2 Meeting			X			X			X			X			X	
WG3 Meeting			X			X			X			X			X	
WG4 Meeting			X			X			X			X			X	
WG5 Meeting			X			X			X			X			X	
1st Training School						X										
2nd Training School												X				
STSM +															X	
Special Topic sessions				X				X				X				X
International conferences															X	

3.1.3. PERT CHART (OPTIONAL)



3.1.4. RISK AND CONTINGENCY PLANS

The Chair, the vice-Chair and the Managing Committee (MC) will be responsible for identifying potential risks, their impacts and for taking a risk response and mitigation actions. They will develop a Risk Assessment and Contingency Plan at the start of the Action including a list of identified risks, their root causes, the main impacts and risk response and mitigation measures.

Indicative list of risks and risk responses and mitigation measures is as follows:

1. The objectives are not achieved at the end of the time scheduled: Regular checking of results and taking any necessary corrective actions to meet the plan.
2. A leading partner decides to leave the Action: The MC will look for another Proposer to take over the tasks and responsibilities to lead the Action to success.
3. Lack of communication among partners: More frequent interactive communication means, e.g., Skype calls and even face-to-face meetings.
4. Schedule and cost limitations: The MC will monitor the schedule and the work progress tightly. The MC will also monitor costs by planning the Action's activities carefully.
5. Delay in submitting deliverables (e.g.: publications): Each WG will set a detailed schedule and work-plan to ensure the risk of delay is minimized.
6. Low participation in the activities, especially STSMs and TSs: Specific actions will be targeted to encourage participation. An STSM and TS coordinator will be appointed.
7. Failure to reach the necessary number of stakeholders and not having the promised impact.

A tailored management plan will be elaborated to make use of the Action Members' resources in relevant fields of expertise, as well as to strengthen information and dissemination procedures.

3.2. MANAGEMENT STRUCTURES AND PROCEDURES

The Action will be managed in accordance with COST rules. The MC will primarily be involved in monitoring the progress of the Action, approving annual reports, overseeing budget allocations and

ensuring inclusiveness. A core group will be formed to oversee some of the more detailed planning and procedures but ensuring approval from the entire MC for delegated actions. The core group will include the chair, vice-chair, all WG leaders, dissemination and outreach officers, STSM and Training School coordinator and the budget holder. In all positions (other than chair and vice-chair) there will be at least two people assigned and always including an ECI.

The MC will meet annually but the core group will ensure communications at regular intervals throughout the year and will meet every three months either virtually or in person. The core group will be agreed at the kick-off meeting and delegated actions will be collectively approved. There will be agreement on communication between WGs and the core group will ensure coherence and coordination.

Each WG will have two leaders and may appoint additional participants in leading roles to ensure the work plan is met. The WGs will ensure regular updates through e-mail communications to the MC and posts on the website. They will provide formal reports twice a year in line with their meetings which will be at least twice a year and encompass the range of activities (workshops, conferences, seminars) relevant to their work plan. Membership of the WGs will remain open throughout the Action with opportunities for participation ensuring inclusivity and involvement of ECIs. The Action will support all participants but particularly ensure participation by female researchers and ECIs who will be encouraged to take on leadership roles. All ECIs will be invited to give presentations at the annual MC meeting.

The MC will monitor progress and achievements every 6 month and highlight opportunities for dissemination and outreach. The outcomes will be compiled within the Action progress report cross-referencing the objectives and deliverables with relevant recommendations as required.

Dissemination and outreach will be a particularly important component of the Action. Therefore the dissemination and outreach officers in the core group will form a small team with participants from across the Action but ensuring 50% membership of Inclusiveness Target Countries (ITCs). The Dissemination and Outreach Team (DOT) will maintain the content of the website ensuring relevance to all the stakeholders outlined within the dissemination plan 2.2.2. The DOT will also seek opportunities to widen outreach and plan events to promote the Action and specifically the activities of WG5.

3.3. NETWORK AS A WHOLE

The network of proposers includes a diverse range of stakeholders including people from academic organisations, museums and botanical gardens Agencies and consultants. The proposers are leading in the fields of CS and biodiversity monitoring (and specifically invasion ecology) with expertise ranging from field ecology to social science. The Action will actively encourage wide participation and will welcome additional participants throughout. 15 COST Countries have participated in the proposal of which 40.0% are inclusiveness countries. The proposal has been led by two female researchers and included ECIs throughout from concept of ideas to drafting the proposal. The enthusiasm for this Action from so many COST member countries highlights the relevance across Europe. ITCs will be involved throughout the Action and across the management structure. The core group will be formed ensuring inclusiveness and activities will be organised in ITCs to provide maximum opportunities for participation and outreach in ITCs. The geographic distribution of participants will be across Europe and beyond. Two International Partner Countries have committed to the work plan of the Action. A number of International Organisations have contributed to the proposal including representation from Global Biodiversity Information Facility (GBIF), Biodiversity Information Standards (TDWG), European CS Association (ECSA), Biodiversity Observation Network (GEO BON), Long-term ecological research (LTER), International Union for Conservation of Nature Invasive Species Specialist Group (IUCN ISSG) and European and Mediterranean Plant Protection Organization (EPPO).

The gender balance of the Proposers is even and measures will be in place to ensure the balance is retained and that there are equal opportunities for leadership and participation. 15.4% (=4) of the Proposers are ECIs and leadership roles have been identified for ECIs with mentoring as required. The proportion of ECIs is anticipated to increase with provision of activities such as STSMs and training schools but also through sessions at workshops, such as speed talks and interactive poster sessions, aiming to attract ECIs and encourage involvement.