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## Добровольческая и неформальная наука: аннотированная библиография 2017–2018 гг.

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## Введение

В этом интерактивном указателе собраны гиперссылки на наиболее значимые свежие англоязычные статьи, доклады, диссертации по проблеме неформальной науки, науки граждан, науки толпы, а также по проблемам проектов научного краудсорсинга. Эти работы не

охватываются существенными монографиями последних лет.<sup>1,2,3,4,5,6,7,8,9</sup> Оперативный обмен опытом и последними достижениями в этой области очень важен. Менеджмент и сопровождение распределенных добровольческих проектов (в которых участники пользуются автономностью, а число их может достигать сотен тысяч) со стороны профессионалов-заказчиков требует изощренного подхода, а правильные управленческие решения зачастую приходится искать методом проб и ошибок.

Интерес к организации неформальных научных проектов во всем мире продолжает расти. Причины такого интереса различны. Применительно к России таких причин, как минимум, две. Во-первых, в нашей науке сегодня существенен кадровый дисбаланс. Если титульных ученых, соответствующих вывеске того или иного НИИ, еще хватает, то некогда мощный слой сотрудников, поддерживающих деятельность собственно ученых, находится на грани исчезновения. Это, например, лаборанты, инженеры, конструкторы, технические писатели, юристы-патентоведы, специалисты, отвечающие за сбор больших массивов данных или за распознавание изображений, в том числе, спутниковых. Такие кадры сегодня ищут, например, среди добровольцев.

Вторая причина в том, что вопрос снижения издержек исследований в российских НИИ и вузах становится жизненно важным. Такие накладные расходы, какие мы выдерживали до сих пор, не может себе позволить даже крупная западная организация, работающая в секторе корпоративной науки. Требования экономии средств особенно наглядно проявляются в областях знаний, связанных со сбором больших массивов данных.

Поддержка неформальных проектов государством никоим образом не отменяет «большую науку», но в ряде стран (например, в Австралии) уже является серьезным объектом национальной научно-образовательной политики. Корпоративный же сектор (пример - компания Proctor&Gamble) уже более 10 лет извлекает ощутимую выгоду от внедрения таких проектов в повседневную практику.

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<sup>1</sup> C. Cooper. Citizen Science: How Ordinary People are Changing the Face of Discovery - 2016 - The Overlook Press. - NY - 288 p.

<sup>2</sup> L. Dickinson, R. Bonney, Jr. Citizen Science: Public Participation in Environmental Research - 2012 - Cornell University Press, Ithaca, USA. - 305 p.

<sup>3</sup> J.A. Cigliano, H.L. Ballard. Citizen Science for Coastal and Marine Conservation - 2017

<sup>4</sup> A. Irwin. Citizen Science: A Study of People, Expertise and Sustainable Development - 2002 - Routledge. - NY - 215 p.

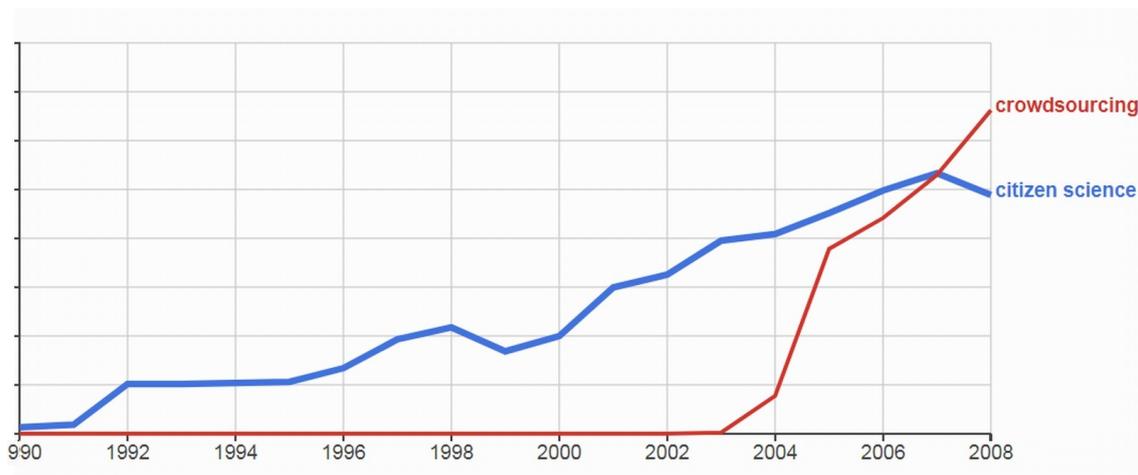
<sup>5</sup> V. Curtis. Online Citizen Science and the Widening of Academia – 2018 - Palgrave Macmillan. - Cham, Switzerland – 199 p.

<sup>6</sup> L.G. Burns. Citizen Scientists: Be a Part of Scientific Discovery from Your Own Backyard. - 2012. - Henry Holt and Company Publishers - NY - 85 p.

<sup>7</sup> N.M. Trautmann. Citizen Science: 15 Lessons that Bring Biology to Life – 2013 - NSTA Press, Arlington, USA - 215 p.

<sup>8</sup> L. Ceccaroni, J. Piera. Analyzing the Role of Citizen Science in Modern Research - 2017 - IGI Global - Hershey, USA - 380 p.

<sup>9</sup> D. Cavalier, E.B. Kennedy. The Rightful Place of Science: Citizen Science – 2016.-Consortium for Science, Policy, & Outcomes – Tempe, USA -152 p.



Частота встречаемости двух терминов в книгах Google Books (словарь English 2009)

В силу быстрого развития этой формы организации научных исследований, до сих пор отсутствуют строгие определения терминов, которые используются в различных статьях и книгах. При сравнении результатов исследований видно, что термины конфликтуют, перекрываются, а их значения могут быть подвержены изменениям с течением времени. По состоянию на 2017 год сложился определенный терминологический консенсус. Принято, что масштабная неформальная научная деятельность реализуется, главным образом с помощью распределенных (дисперсных) проектов, которым относятся коллективная интеллектуальная деятельность (КИД), научный краудсорсинг, наука толпы (*crowd science*), наука граждан (*citizen science*). В России ограниченные по масштабам орнитологические наблюдения, ведущиеся с 2000 года, за неимением в те годы аналогичных терминов получили название «народный мониторинг».

На приведенном выше графике, полученном с помощью сервиса Google Books Ngram Viewer, показана частота упоминания терминов *citizen science* и *crowdsourcing* в массиве англоязычных книг по годам издания. Первый термин (который, по мнению автора, следует переводить как «наука граждан»), существовал и до того, как ИТ технологии стали всеобъемлющими. Второй термин обозначает проекты, принципиально опирающиеся на информационные технологии.

Многочисленные и модные сегодня краудсорсинговые проекты, в основном, научные цели не преследуют. Поэтому со стороны исследовательского сообщества последовал ответ. Попытки ввести конструкты типа *science crowdsourcing* или *SciSourcing* имели лишь частичный успех. Сегодня, при наличии выхода в виде научного результата краудсорсинговому проекту, как правило, придается статус «науки толпы». Наука граждан сегодня уже понимается как долговременное распределенное научное исследование, в которое вовлечено наряду с профессионалами значительное число мотивированных любителей или непрофессионалов. Оно может быть не связано с конкретным проектом и не всегда ограничивается временными рамками. Таким образом, краудсорсинговые проекты с их высокой ИТ культурой изменили смысл науки граждан, сделали науку граждан массовой, что косвенно и отражает вышеприведенный рисунок. А ведь ранее массовые проекты заинтересованных в результате граждан были, скорее, исключением. По большей части, к науке граждан относились индивидуальные неформальные исследования (любительская астрономия, наблюдения отдельных натуралистов...). В свою очередь, краудсорсинговые проекты испытали влияние науки граждан. Они «потянулись» к науке граждан, получили недостававшие ранее мотивацию и азарт участников.

Термин «наука граждан» для описания явления на русском языке представляется удачным, но полного его признания пока еще нет. В ряде публикаций и выступлений используется не очень удачный термин «гражданская наука». Дело в том, что термин «гражданская наука» уже давно

является эквивалентом термина *civil science*, и противопоставляется он термину *military science* («оборонная наука»). Также, представляется не очень удачной попытка перевода термином «общественная наука». Ведь в обратном переводе это - *social science*. Будем надеяться, что парный термин «наука толпы» - «наука граждан» приживется в нашей литературе.

Эти терминологические замечания следует иметь в виду, работая со статьями, ссылки на которые размещены в данном материале. Материал разбит на определенные тематические главы. Укрупненно, в первой части упорядочены ссылки на работы по общим вопросам распределенной неформальной науки. Вторая часть посвящена новым достижениям неформальных проектов в предметных областях. В этой второй части учтены только работы, представляющие реальные научные результаты в предметных областях, в свою очередь, эти результаты удовлетворяют серьезным требованиям научного сообщества. Некоторые заголовки разделов пришлось дать на английском языке (отсутствовали русскоязычные аналоги терминов).

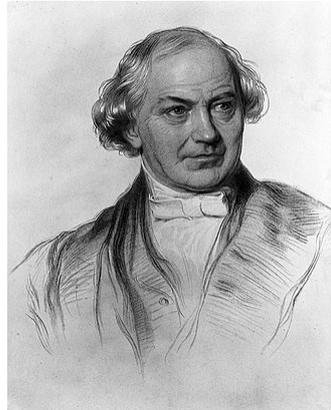
И, наконец, в данном материале не рассматриваются исследования «неформальной» деятельности маргинальных лиц, либо неформальных маргинальных групп лиц, претендующих на занятия наукой, но научных результатов в их классическом понимании не выдающих. Дело в том, что уже имеется большой массив литературы по проблеме лже-науки.

В первой половине материала приведены ссылки на работы связанные с отработкой технологии добровольческих проектов. Во второй половине рассматриваются конкретные предметные области. Переход к источнику работы производится прямым «кликом» на названии работы. Если прямой «клик» по каким-то причинам не срабатывает, необходимо скопировать гиперссылку и вставить в поисковую строку браузера. На странице источника подскажут, каким образом можно получить полный текст работы. Приведенные аннотации отредактированы и сокращены, но сохранены на языке оригинала по двум причинам: (а) в новой области знаний неизбежны ошибки перевода и (б) читатель, которого заинтересовала та или иная работа, переходит к ее источнику и далее - к англоязычному тексту.

## **Научный краудсорсинг, наука толпы, наука граждан**

Можно согласиться с автором первой из указанных выше монографий, Карен Купер. Она доказала, что исторически первым проектом науки граждан, отвечающим и сегодняшним требованиям, был масштабный океанологический проект Уильяма Уивелла, проведенный в 1835 году.

Сегодня этот проект, скорее, назвали бы проектом науки толпы: участники поставляли только «сырые» данные и, в дальнейшем, интереса к научной стороне океанологии не проявляли. Более подробно, это исследование будет прокомментировано во вступлении к соответствующей, океанологической, главе. Здесь отметим, что за по результатам этого исследования в 1837 году Уивелл был удостоен Большой медали Королевского общества Британии. Уивелл был весьма разносторонним исследователем, к тому же он имел вкус к изобретению и пропаганде новых терминов. Его авторству принадлежат термины *scientist*, *physicist*, *ion*, *cathode*, *anode* и другие. Однако термина, характеризующего открытый им способ коллективного неформального получения новых знаний, он не предложил.



Уильям Уивелл (1794-1867)

источник: Википедия

Термин «*наука граждан*» появился много лет спустя. В соответствующих исследованиях отмечают, что *гражданин* - это тот, кто имеет права и обязанности участвовать в некоторых крупных коллективных (например, управление) мероприятиях, а, следовательно, *ученые-граждане* - это люди, реализующие права и обязанности для участия в коллективных научных мероприятиях. Участие в процессе управления предполагает индивидуальный вклад ценностей, мнений и перспектив в процесс принятия решений; участие в научном процессе предполагает приобщение индивидуальных наблюдений и любительского опыта к вновь полученному знанию. В первом случае индивидуум голосует, во втором - представляет данные.

В данном разделе представлены гиперссылки к современным публикациям по общим вопросам распределенной добровольческой науки. Работы часто относятся к жанру т.н. *case studies*. Они показывают, что, в целом, тенденция сохраняется. Менеджеры краудсорсинговых проектов не читают теоретические работы и ищут решения «наощупь». Исследователи, в свою очередь, продолжают наблюдения за их действиями по поиску решений.

Также, в новых работах имеется большое число ранее не встречавшихся аббревиатур и терминов, например, *micro-specialized crowds*.

### [Citizen Science](#)

L Strang, RK Simmons - 2018

*One of citizen science approaches is crowdsourcing, which draws on a large pool of people who individually make small contributions that add up to big efforts. Citizen science approaches like crowdsourcing can make the systematic review process more efficient, timely and relevant. With appropriate quality control mechanisms and participant training in place, the outputs from crowdsourced reviews may be of a high enough quality to meet the threshold of a traditional 'gold standard' systematic review. Some challenges arise when involving a large group of participants with diverse backgrounds in crowdsourced systematic reviews. Participant drop-out rates can be high. To encourage participation and retention, crowd participants should be provided with clear goals and welldefined tasks, as well as feedback and rewards. As in other types of research, it is important to ensure that projects are conducted ethically and responsibly, particularly in relation to potential crowd participant exploitation.*

### [Citizen Science](#)

KL Mercer - Journal American Water Works Association, 2018

*Encouraging the public to care more about our water systems and services is the responsibility of every water professional, and it seems like an easy sell given that water directly affects public health and underpins the livelihoods and lifestyles that define our communities. One way to expand opportunities for community engagement beyond a community wide event or issue is through citizen science. Citizen science — scientific research that is conducted in whole or in part by amateur*

scientists — is an opportunity for water professionals to connect with community members who are issue focused and to influence and engage those whose interests lie elsewhere. Citizen science projects can be relatively low cost because they typically involve volunteers who are motivated by civic duty or community activism. Of course, these projects require time, resources, and oversight, including promotion/recruitment, training, and ongoing data collection and validation.

### Citizen Science

S Parks, C d'Angelo, S Gunashekar - 2018

Researchers seeking to gather opinions from stakeholders have more options than ever before, thanks to a diverse range of digital citizen science resources. Online idea-generation platforms use crowdsourcing to engage large groups of people to help solve problems and develop innovations, while consensus-exploring tools draw on smaller groups to help researchers understand a range of opinions and achieve consensus on a particular topic. Such approaches could be useful in healthcare improvement studies, helping gather expert ideas from NHS staff and patients and building consensus on important issues.

### Citizen Science

CA Lichten, B Ioppolo, C d'Angelo, RK Simmons... - 2018

Crowdsourcing draws on a large pool of people to gather inputs such as ideas, funding or labour. It can be used in citizen science research projects, where "citizens"—usually members of the public—provide inputs and valuable contributions despite not being formally trained experts in the topic of study. This learning report provides a practical overview of the use of crowdsourcing in scientific research projects.

### Who Takes Part in Online Citizen Science?

V Curtis - Online Citizen Science and the Widening of Academia, 2018

Demographic data about participants in online citizen science is collated in an attempt to explore whether these projects appeal to specific groups of people. The available data suggests that projects appeal predominantly to well-educated men, with an existing interest in science. Participants are also more likely to be from the developed world. Some have stated that citizen science helps to 'democratise' science, yet is that actually the case in light of the available data? How online citizen science can be made more accessible and inclusive is considered.

### Realising the Potential of Online Citizen Science

V Curtis - Online Citizen Science and the Widening of Academia, 2018

Findings from the case studies have shown that many facets of participation are inter-related and are mediated by the complexity of the project task. Current findings also suggest that there are certain characteristics that may make for a more successful online citizen science project. While online citizen science has indeed opened up the black box of science for many active participants, more may be done to increase its inclusivity. New developments in mobile technology, inquiry-based learning, and using online citizen science in a wider variety of settings (such as museums or formal classrooms), may help to increase access across different sectors of the population, and to parts of the world that may have a greater stake in the outcomes of the research.

### Digital Science: Cyberinfrastructure, e-Science and Citizen Science

RCS Pacheco, ER Nascimento, RO Weber - Knowledge Management in Digital ..., 2018

Digital change and scientific development have mutual implications. On one hand, science and technology development has been a major factor to digital change. On the other hand, the digital era has brought major changes to scientific knowledge production. First, there is a cyberinfrastructure—not only infrastructure for computing, but a major virtual lab where all professionals in science and technology (e.g., researchers, engineers, technicians) can collaborate and exchange data, information, and knowledge. In Europe, this new infrastructure is referred to as e-science. Second, the digital era has increased coproduction beyond frontiers of traditional players, bringing other participants to scientific development. Such kind of co-work is central to both citizen science and

*transdisciplinary knowledge coproduction, where non-academic players engage in activities such as planning, data gathering, and impact assessment of science. In this chapter, we define digital science as a convergent phenomenon of cyberinfrastructure, e-science, citizen science and transdisciplinarity.*

[\[PDF\] Cultivating the Growth of Life-Science Graduates: on the Role of Educational Ecosystems](#)

P den Brok - 2018

*Citizen science is a new trend, with citizens involved in the collection of research data and analysis – think of the insect and bird counting days. People attract their own funding and materials via crowd sourcing and crowd funding .*

[Science engagement in South Africa](#)

JM Hulbert, F Roets - Science, 2018

*Learners from grades 9 to 12 surrounded our Science Week table in the township Khaye-litsha, an impoverished community near Cape Town in South Africa. We were conducting outreach for our project Cape Citizen Science (<http://citsci.co.za/>), an initiative to engage nonscientists in plant disease research in a global biodiversity hotspot.*

[International Citizen Science Day](#)

I Ebrahim - Veld & Flora, 2018

*This year the South African Citizen Science network joined the international community by celebrating International Citizen Science Day. The initiative is presented by SciStarter and the Citizen Science Association. South Africa is fortunate to have a great network of citizen science initiatives so it was time for us to showcase the amazing projects happening in South Africa. There was launched a social media campaign on Facebook and all the partner organisation websites and blogs..*

[On the Integration of Crowd Knowledge in Pattern Recognition](#)

R Zhang, Y Mao - Pattern Recognition Letters, 2018

*This paper is concerned with the fundamentals of integrating crowd knowledge such as ratings, opinions or tags provided by the internet users. As a concrete example, we consider the problem of image recognition based on user-provided tags. Each user is assumed to have certain knowledge about the images, which can be incomplete or only of partial relevance to the recognition task. Each user is also assumed to have his own choice of tag vocabulary, possibly different from the set of prescribed labels for image recognition. We argue that a user's knowledge can be separated into the structure of the knowledge and the representation of the structure (namely, his tag vocabulary). This perspective advocates a systematic three-step methodology for crowd knowledge integration in such applications, whereby the problem of interest is decoupled into three sub-problems in tandem: knowledge structure aggregation, vocabulary interpretation, and label assignment. We derive a lower bound for the achievable error probability. Using this bound and via Monte-Carlo simulations, we investigate the performance of a knowledge integration system in relation to various parameter settings.*

[A Closer Look at Motivation: Citizens and Scientists](#)

V Curtis - Online Citizen Science and the Widening of Academia, 2018

*Motivation to participate in Foldit, Folding@home and Planet Hunters is considered in detail using data obtained from surveys, interviews and participant-observation. The way motivation can change over time is explored. The factors that initiate motivation are not the same as those that sustain participation over time. Key project parameters such as the complexity of the task and the presence of an online community influence how long some participants remain with a project. Complex tasks can pose a high barrier to participation, yet they can stimulate the formation of online communities which become important to some citizen scientists. Finally, the motivations of the scientists and developers who set up the projects are considered.*

## [Motivation for Participation: From General Volunteerism to Online Citizen Science](#)

V Curtis - *Online Citizen Science and the Widening of Academia*, 2018

*Some citizen scientists are incredibly committed to a project and spend many hours a week on the project task sometimes over many months or years. This chapter considers previous research in this area and begins by considering the motivation to take part in more general forms of volunteering and in other types of ‘commons-based peer production’ such as editing for Wikipedia and writing open source software which have some similarities with online citizen science. It then considers research work on online citizen science, with results generally illustrating that participants are often quite altruistic in their motivation and take part because they want to help scientists make new discoveries.*

## [\[PDF\] Investigating Crowd Creativity in Online Music Communities](#)

F Calefato, G Iaffaldano, F Lanubile, F Maiorano - *arXiv preprint arXiv:1809.06172*, 2018

*Crowd creativity is typically associated with peer-production communities focusing on artistic products like animations, video games, and music, but less frequently to Open Source Software (OSS), despite the fact that also developers must be creative to come up with new solutions to their technical challenges. In this paper, we conduct a study to further the understanding of which factors from prior work in both OSS and art communities are predictive of successful collaboration - defined as reuse of previous songs - in three different songwriting communities, namely Songtree, Splice, and ccMixer. The main findings from this study confirm that the success of collaborations is associated with high community status of recognizable authors and low degree of derivativity of songs.*

## [Crowdsourcing and Massively Collaborative Science: a Systematic Literature Review and Mapping Study](#)

A Correia, D Schneider, B Fonseca, H Paredes - *International Conference on ...*, 2018

*Current times are denoting unprecedented indicators of scientific data production, and the involvement of the wider public (the crowd) on research has attracted increasing attention. Drawing on review of extant literature, this paper outlines some ways in which crowdsourcing and mass collaboration can leverage the design of intelligent systems to keep pace with the rapid transformation of scientific work. A systematic literature review was performed following the guidelines of evidence-based software engineering and a total of 148 papers were identified as primary after querying digital libraries. From our review, a lack of methodological frameworks and algorithms for enhancing interactive intelligent systems by combining machine and crowd intelligence is clearly manifested and we will need more technical support in the future. We lay out a vision for a cyberinfrastructure that comprises crowd behavior, task features, platform facilities, and integration of human inputs into AI systems.*

## [\[HTML\] A Framework for Articulating and Measuring Individual Learning Outcomes from Participation in Citizen Science](#)

T Phillips, N Porticella, M Conostas, R Bonney - *Citizen Science: Theory and Practice*, 2018

*Since first being introduced in the mid 1990s, the term “citizen science”—the intentional engagement of the public in scientific research—has seen phenomenal growth as measured by the number of projects developed, people involved, and articles published. In addition to contributing to scientific knowledge, many citizen science projects attempt to achieve learning outcomes among their participants, however, little guidance is available for practitioners regarding the types of learning that can be supported through citizen science or the measuring of learning outcomes. This study provides empirical data to understand how intended learning outcomes first described by the informal science education field have been employed and measured within the citizen science field. We also present a framework for describing learning outcomes that should help citizen science practitioners, researchers, and evaluators in designing projects and in studying and evaluating their impacts. This is a first step in building evaluation capacity across the field of citizen science.*

## [\[PDF\] Web Science: Now More Than Ever](#)

J Hendler, W Hall, N Contractor - *Computer*, 2018

*This special issue explores the many facets of Web Science, the study of the Web's impact on our society and technology, and how we can use it to achieve our dreams without living our nightmares.*

[Upon the Academic Philosopher Caught in the Fly-Bottle](#)

JP Van Bendegem - Past, Present, and Future Possibilities for Philosophy ..., 2018

*Philosophy as an academic discipline has grown into something highly specific. This raises the question whether alternatives are available within the academic world itself - what I call the Lutheran view - and outside of academia (with or without support from the inside) - what I call the Calvinist view. Since I defend the thesis that such alternatives partially exist and as yet non-existent possibilities could in principle be realised, the main question thus becomes what prevents us from acting appropriately. In honour of Paul Smeyers, the fitting metaphor has to be the Wittgensteinian fly-bottle.*

[\[PDF\] Supporting Large Scale Collaboration and Crowd-Based Investigation in Economics: A Computational Representation for Description and Simulation of Financial ...](#)

J Faleiro - 2018

*Large-scale collaboration, when applying the steps of scientific investigation, is an efficient way to leverage crowd science to accelerate research in finance. Unfortunately, the current reality is far from that. Evidence shows that current methods of investigation in finance in most cases do not allow for reproducible and falsifiable procedures of scientific investigation. As a consequence, the majority of financial decisions at all levels, from personal investment choices to overreaching global economic policies, rely on some variation of try-and-error and are mostly non-scientific by definition. We lack transparency for procedures and evidence, proper explanation of market events, predictability on effects, or identification of causes. There is no clear demarcation of what is inherently scientific, and as a consequence, the line between fake and true is blurred. In this research, we advocate the use of a next-generation investigative approach leveraging forces of human diversity, micro-specialized crowds, and proper computer-assisted control methods associated with accessibility, reproducibility, communication, and collaboration.*

[\[PDF\] Crowd Sourcing In Software – a Study](#)

D Swathi - INTERNATIONAL JOURNAL OF SCIENTIFIC ..., 2018

*The term crowd sourcing has entered software engineering practice. Internal development, contracting, and outsourcing still dominate, however crowd sourcing is a major source for software development projects for a various reasons, whether it is to squash bugs, test their software, or gather alternative designs for a new user interface. While the overall impact has been routine thus far, crowd sourcing has the potential to lead to fundamental and disruptive changes in how software will be developed in the future. This paper explores the models of crowd sourcing that have been applied to software development to date, outlines the exciting opportunities that exist, and articulates a series of challenges that must be overcome for crowd sourcing software development to truly reach its potential.*

[The Wisdom of Amateur Crowds: Evidence from an Online Community of Sports Tipsters](#)

A Brown, JJ Reade - European Journal of Operational Research, 2018

*We analyse the accuracy of crowd forecasts produced on Oddsportal, an online community of amateur sports tipsters. Tipsters in this community are ranked according to the betting return on their tips, but there are no prizes for accuracy. Nevertheless, we find that aggregated tips in this community contain information not in betting prices. A strategy of betting when a majority predict an outcome produces average returns of 1.317% for 68,339 events. The accuracy of these forecasts stems from the wisdom of the whole crowd, as selecting sections of the crowd based on experience or past forecast accuracy does not improve betting returns.*

[\[PDF\] Citizen Science in School](#)

ML Redondo, MAQ Dios, MCS Manzanares... - 2018

*One of the main problems facing European society is the decline of students who choose scientific or technological careers after finishing high school. Encouraging interest in science is essential to approach the current problem of shortage of scientific vocations. This paper describes a citizen science experience accomplished in a school located in the center of a city in the North of Spain. 42 Secondary students completed a questionnaire based on a previous study by RecerCaixa. The results show a significant positive change in the student's perception of science and scientists. In addition, students highly appreciated their participation in the activity.*

[\[PDF\] Optimizing Interventions via Offline Policy Evaluation: Studies in Citizen Science](#)

A Segal, K Gal, E Kamar, E Horvitz, G Miller – 2018

*Volunteers who help with online crowdsourcing such as citizen science tasks typically make only a few contributions before exiting. We propose a computational approach for increasing users' engagement in such settings that is based on optimizing policies for displaying motivational messages to users. The approach, which we refer to as Trajectory Corrected Intervention (TCI), reasons about the tradeoff between the long-term influence of engagement messages on participants' contributions and the potential risk of disrupting their current work. We combine model-based reinforcement learning with off-line policy evaluation to generate intervention policies, without relying on a fixed representation of the domain. TCI works iteratively to learn the best representation from a set of random intervention trials and to generate candidate intervention policies.*

[Citizen Crowdsourcing: 'Ask Not What Your Country Can Do for You...'](#)

P Robbins - Exploring the Culture of Open Innovation: Towards an ..., 2018

*Citizen crowdsourcing is now well-established. This chapter sets out to assess how successful it has been as a mechanism for finessing original and meaningful ideas that advance social goals. We look briefly at leading examples of crowdsourcing for social good. We also look at the underlying factors that support it, including the knowledge and input solicited from the crowd; the crowd's willingness to participate; and the mechanisms through which the crowd can engage. We trace the idea and practice of crowdsourcing back to Socrates in ancient Athens. We look at prosocial behaviour, exploring selected annals of public intellectuals, including Emerson. We examine citizen science as a forerunner of crowdsourcing, then move into the business strategy of open innovation and, finally, we arrive at crowdsourcing for social good in various guises. In conclusion, we explore what has been learned from initiatives that can now be considered current best practice in this area.*

[\[PDF\] High Frequency Labor](#)

J PRPIĆ

*Continued technological progress has placed IT at the epicenter of new markets, spawning a significant reduction in traditional market search and market coordination costs. In this work, premised on the observation that virtual labor markets (VLMs) can generally be engaged through two different modes of IT (i.e. Dashboard vs. API), this exploratory work begins to unpack the ramifications of these material differences for Crowdsourcing market function.*

[\[HTML\] A review of knowledge management about theoretical conception and designing approaches](#)

T Gao, Y Chai, Y Liu - International Journal of Crowd Science, 2018

*The main purpose of this paper is to conduct an in-depth theoretical review and analysis for the fields of knowledge management (KM) and investigate the future research trend about KM. At first, few theoretical basis about KM which include definitions and stages about KM have been summarized and analyzed. Then a comprehensive review about the major approaches for designing the KM system from different perspectives including knowledge representation and organization, knowledge sharing and performance measure for KM has been conducted. The contributions of this paper will be useful for both academics and practitioners for the study of*

KM. For this research, the focus is on conducting an in-depth theoretical review and analysis of KM.

[\[HTML\] Literature Review on Collective Intelligence: a Crowd Science Perspective](#)  
C Yu, Y Chai, Y Liu - International Journal of Crowd Science, 2018

*Collective intelligence has drawn many scientists' attention in many centuries. This paper shows the collective intelligence study process in a perspective of crowd science. After summarizing the time-order process of related researches, different points of views on collective intelligence's measurement and their modeling methods were outlined. The authors show the recent research focusing on collective intelligence optimization. The studies on application of collective intelligence and its future potential are also discussed. This paper will help researchers in crowd science have a better picture of this highly related frontier interdisciplinary.*

[Using Citizen Science Projects to Develop Cases for Teaching Digital Curation](#)  
AL Cushing - International Conference on Information, 2018

*Previous research suggests that citizen science project may involve many digital curation issues. In order to develop real world cases for teaching digital curation, seventeen managers of citizen science projects were interviewed. After digital curation issues were identified, findings were used to create teaching cases for digital curation education. One case related to the conceptualise phase of the DCC lifecycle is described. Utilising existing research data to develop cases could be useful for researchers who wish to teach concepts contextualised by "real world" events.*

[\[PDF\] From Dissemination to Citizen Science](#)  
E Alleva, S Macrì - Annali dell'Istituto Superiore di Sanità, 2018

*Recent efforts broadened the potentials offered by Citizen Science by requesting public participation in the observation of dog behaviours in the field of applied methodology. Dogs, in particular, owing to their progressive gathering within the ever-growing boundaries of the urban settings, represent a natural test-bed of data collection by interested and motivated citizens.*

[Cultivating Community Interactions in Citizen Science: Connecting People to Each Other and the Environment](#)  
BA Finley - 2017

*Citizen science leverages a distributed user-base which participates in crowd-sourced scientific inquiry. Geotagger is a citizen science project that allows people to collaboratively investigate the natural world around them and share their findings. Citizens are rarely compensated for their work and individual contributors can feel isolated which leads to motivation problems. This thesis focuses on engaging citizen scientists and motivating their contributions via social interaction and engagement. As a part of this work, a number of social enhancements have been developed as extensions to the existing Geotagger project. These enhancements and their effect on social engagement were evaluated using in-field studies and design investigations with children. In the studies, children engaged effectively with each other using the social enhancements in Geotagger, and showed a preference for the application that included these social enhancements.*

[Citizen Observatories: Challenges Informing an HCI Design Research Agenda](#)  
A Seffah - Interactions, 2018

*Human-data interaction (HDI) is an emerging field of research grounded in the tradition of HCI and some related disciplines, such as media and information studies. The term, coined by researchers from the MIT Media Lab, generally refers to the collection, storage, analysis, and use of personal data. This includes data from multiple sources, private and personal data, open data, and data from networked sensors. All this data can be put together or linked via humans. A CO forms a data-intensive, sociotechnical, highly interactive system.*

[\[PDF\] Social Bayesian Learning in the Wisdom of the Crowd](#)

D Adjodah, Y Leng, SK Chong, P Krafft, A Pentland - arXiv preprint arXiv:1712.09960, 2017

*Being able to correctly aggregate the beliefs of many people into a single belief is a problem fundamental to many important social, economic and political processes such as policy making, market pricing and voting. Although there exist many models and mechanisms for aggregation, there is a lack of methods and literature regarding the aggregation of opinions when influence and learning between individuals exist. This is in part because there are not many models of how people update their belief when exposed to the beliefs of others, and so it is hard to quantify the dependencies between people's mental models which is essential to minimizing redundancies in the aggregation. In this paper, we explore many models of how users influence and learn from each other, and we benchmark our models against the well-known DeGroot model. It is shown, that the new Social Bayesian model is superior to the other models tested.*

[The Pertinence of Sutton's Law to Exposure Science: Lessons from Unconventional Shale Gas Drilling](#)

BD Goldstein - Journal of Exposure Science & Environmental ..., 2018

*Sutton's Law urges the medical practitioner to utilize the test that goes directly to the problem. When applied to exposure science, Sutton's Law would argue that the major emphasis should be on techniques that directly measure exposure in or close to the human, animal or ecosystem receptors of concern. Exposure science largely and appropriately violates Sutton's Law by estimating exposure based on information on emissions or measurements obtained at a distance from the receptors of concern. I suggest four criteria to help determine whether Sutton's law should be violated for an innovative technology, and explore these criteria in relation to potential human exposure resulting from unconventional gas drilling (UGD). For UGD, the complexity of the technology including many possible release points at different time periods; the existence of three variable mixtures of chemical and physical agents as well as possible unknown reactants; the demonstrated large variation in releases from site to site; and deficiencies in transparency and regulatory oversight, all suggest that studies of the potential health impact of UGD should follow Sutton's Law. This includes the use of techniques that more directly measure exposure close to or within the receptors of concern, such as biological markers or through community-based citizen science.*

[What Makes a Successful Citizen Science Program?](#)

K Herman - Monitoring Threatened Species and Ecological ..., 2018

*Australia has a long history of working with volunteers across its conservation programs. Discussion among project managers identified four key elements that must be considered in order to create successful threatened species citizen science projects. Data collection and management, participant engagement and retention, and conservation actions, each direct the project towards the fourth element, species recovery objectives. How each of these elements function independently, and interact with each other, will direct the overall success of a program in terms of species recovery. However, ways of measuring the other benefits of citizen science projects has remained largely unresolved. This chapter provides some lessons learned through BirdLife's ongoing involvement with citizen science volunteers.*

[\[PDF\] Science of Complex Systems and Citizenship Skills: A Pilot Study with Adult Citizens](#)

E Barelli, L Branchetti, G Tasquier, L Albertazzi... - ... of Mathematics, Science ..., 2018

**Примечание: STEM - это комплексный курс обучения в областях: science, technology, engineering and mathematics**

*The issue of scientific citizenship in the context of STEM education has been under debate for over two decades. We present a preliminary study which aims to investigate if, how and why the development of hard scientific skills grounded in the discipline of complex systems (suitably simplified and adapted) may foster the development of citizenship skills that can impact on people's approaches to facing problems and making decisions. We carried out a pilot study with a group of 34 volunteer adult citizens.*

## [Citizen Science and Informal Learning: a Brief Commentary](#)

C Herodotou - 2018

*Citizen science and crowd sourcing are often used interchangeably to denote the participation of the general public in social activities or projects. The "crowd" becomes a source of information when it contributes ideas, content, or services to solve a problem, generate content, raise funds, and vote best solutions. Wikipedia ([https://en.wikipedia.org/wiki/Main\\_Page](https://en.wikipedia.org/wiki/Main_Page)) is a crowd sourcing example where a large number of people adds or curates information online resulting in the collective creation of a considerably large encyclopaedia. Kickstarter ([www.kickstarter.com](http://www.kickstarter.com)) is an online crowd sourcing website where people share their project ideas and request funds from the general public to implement these ideas. The term citizen science is more specific; it is used to denote the participation of the public in scientific or research projects. Members of the public volunteer to support the work of scientists by contributing data to projects initiated by professionals and research institutions. The Oxford English Dictionary (OED, 2016) defines citizen scientists as amateurs who engage in scientific work in collaboration or under the supervision of professional scientists with the aim to serve the community.*

Методы и показатели проектов научного краудсорсинга

Менеджменту распределенных проектов помимо обычного исполнения графика работ, приходится решать ранее не встречавшиеся задачи: обеспечивать рекрутинг и мотивацию участников, удерживать участников от выхода из проектов, а также защищать промежуточные и окончательные результаты от невольных ошибок и заведомо недобросовестных поступлений данных. Для широкого использования краудсорсинговых данных должны быть обеспечены гарантии качества и валидации данных, а также выполнено постоянное обучение участников и надзор. Общими усилиями заказчиков и исполнителей проектов выработаны показатели качества результатов и меры точности данных в массивах. Среди представленных в главе новых работ интерес представляет статья, посвященная алгоритму разбиения сложных задач на более простые составляющие (алгоритм SLADE). Алгоритм удивительным образом напоминает рекомендации психологов отдельному человеку, борющемуся с прокрастинацией из-за страха перед необъятными заданиями.

Также, развитие получили организационные методы, направленные на развитие горизонтальных связей «доброволец-доброволец» в интересах повышения креативности коллектива, в то время как раньше доминировали связи «доброволец-менеджер». В других работах по этому же поводу используются другие, ранее не употреблявшиеся термины, перевода которым пока нет, например *"co-created modality beyond the usual contributory paradigm"*.

## [\[PDF\] Development of a Citizen Science Stream Monitoring Program for Western Pennsylvania High School Students and Effects on Student Learning](#)

E Janetski - 2018

*This study evaluates changes in environmental attitudes, attitudes toward science and environmental literacy among high school student participants in a citizen science stream monitoring program. Partnerships with local high school science teachers, environmental groups, and government offices were formed to generate a citizen science program for students to participate in research in the local streams. The project was incorporated directly into high school curriculum and included development of lesson plans to correspond with the citizen science experience. Analysis of pre- and post-surveys revealed that participation in the program improved environmental attitudes and attitudes toward science. This project demonstrates that citizen science participation positively influences environmental attitudes, and that citizen science can be successfully incorporated into classroom curriculum.*

[\[PDF\] Participants' Motivations to Contribute to Biodiversity Citizen Science Projects](#)

M Lotfian, J Ingensand, O Ertz, S Composto... - 2018

*The public participation in scientific projects (citizen science) is significantly increasing specially with technology developments in recent years. Volunteers play an essential role in citizen science projects, therefore understanding their motivations, and understanding how to sustain them to keep contributing to the project are of utmost importance. This paper presents the analysis of volunteers' characteristics and their motivations to contribute to a citizen science project, which aims at encouraging citizens to take action for biodiversity. The results from the online survey illustrate that people are more motivated by intrinsic nature-related motives rather than extrinsic motivations.*

[Crowd Science: Methods to Motivate Contributors and Firms' Benefits](#)

F Cappa - 2018

*Crowd science: definition, trend and research questions. Activating social strategies: face-to-face interaction in technology-mediated citizen science. Bring them aboard: rewarding participation in technology mediated citizen science projects. When does crowdsourcing benefit firm performance*

[SLADE: A Smart Large-Scale Task Decomposer in Crowdsourcing](#)

Y Tong, L Chen, Z Zhou, HV Jagadish, L Shou, W Lv - IEEE Transactions on ..., 2018

*Crowdsourcing has been shown to be effective in a wide range of applications, and is seeing increasing use. A large-scale crowdsourcing task often consists of thousands or millions of atomic tasks, each of which is usually a simple task such as binary choice or simple voting. To distribute a large-scale crowdsourcing task to limited crowd workers, a common practice is to pack a set of atomic tasks into a task bin and send to a crowd worker in a batch. It is challenging to decompose a large-scale crowdsourcing task and execute batches of atomic tasks, which ensures reliable answers at a minimal total cost. Large batches lead to unreliable answers of atomic tasks, while small batches incur unnecessary cost. In this paper, we investigate a general crowdsourcing task decomposition problem, called the Smart Large-scale task DEcomposer (SLADE) problem, which aims to decompose a large-scale crowdsourcing task to achieve the desired reliability at a minimal cost. We prove the NP-hardness of the SLADE problem and propose solutions in both homogeneous and heterogeneous scenarios.*

[\[PDF\] When Scientists Become Social Scientists: How Citizen Science Projects Learn About Volunteers](#)

PT Darch - arXiv preprint arXiv:1802.00362, 2018

*Online citizen science projects involve recruitment of volunteers to assist researchers with the creation, curation, and analysis of large datasets. Enhancing the quality of these data products is a fundamental concern for teams running citizen science projects. Decisions about a project's design and operations have a critical effect both on whether the project recruits and retains enough volunteers, and on the quality of volunteers' work. The processes by which the team running a project learn about their volunteers play a critical role in these decisions. Improving these processes will enhance decisionmaking, resulting in better quality datasets, and more successful outcomes for citizen science projects. This paper presents a qualitative case study, involving interviews and long-term observation, of how the team running Galaxy Zoo, a major citizen science project in astronomy, came to know their volunteers and how this knowledge shaped their decision-making processes.*

[Patterns of Volunteer Behaviour Across Online Citizen Science](#)

H Spiers, A Swanson, L Fortson, BD Simmons... - Companion of the The Web ..., 2018

*Human-computer systems are increasingly applied to data reduction problems; citizen science platforms (e.g. the Zooniverse) are one type of such a system. These platforms function as social machines, combining volunteer efforts with automated processes to enable distributed data analysis. The rapid growth of this approach is increasing the need to understand how we can improve volunteer interaction and engagement. Here, we utilize the most comprehensive collection of online citizen science data gathered to date to examine multiple variables across 63 Zooniverse projects. Our analyses reveal how subtle design changes can influence many facets of volunteer interaction,*

generating insights that have implications for the design and study of citizen science projects, and future research.

[\[PDF\] Characterizing Novelty as a Motivator in Web-Based Citizen Science](#)

CB Jackson - 2018

*This thesis explores the topic of user motivation in web-based citizen science projects. Motivation is an important topic for online communities and findings from research about user motivation help software developers and project managers re-enforce motivational aspects of user involvement which produce positive outcomes such as increased contribution. Research on motivation in citizen science is especially important as participation is voluntary and volunteers have little to no formal ties to the project. This thesis examines the role of novelty as a motivational component in online citizen science projects. Citizen science is an interesting context for exploring novelty as volunteers often analyze new data which could lead to scientific discovery.*

[Grey Literature and Professional Knowledge Making](#)

J Schöpfel - Research Outside The Academy, 2019

*What does grey literature mean? What role does it play in the production and dissemination of practitioner knowledge? How do reports, presentations and communications, working papers and other unpublished material contribute to professional, extra-academic knowledge making? The following paper tries to provide some elements for a better understanding of grey literature, with examples from different collections and disciplines. Moreover, it puts the focus on critical issues like standards, identifiers and quality, and it discusses the impact of open science, i.e. the movement to make scientific research, data and dissemination accessible to all levels of an inquiring society, amateur or professional. Further research could be conducted in the field of grey literature, especially in archaeology and extra-academic research, and on new forms of scientific communication in the environment of open science and citizen science.*

[SciCrowd: Towards a Hybrid, Crowd-Computing System for Supporting Research Groups in Academic Settings](#)

A Correia, D Schneider, H Paredes, B Fonseca - International Conference on ..., 2018

*The increasing amount of scholarly literature and the diversity of dissemination channels are challenging several fields and research communities. A continuous interplay between researchers and citizen scientists creates a vast set of possibilities to integrate hybrid, crowd-machine interaction features into crowd science projects for improving knowledge acquisition from large volumes of scientific data. This paper presents SciCrowd, an experimental crowd-powered system under development "from the ground up" to support data-driven research. The system combines automatic data indexing and crowd-based processing of data for detecting topic evolution by fostering a knowledge base of concepts, methods, and results categorized according to the particular needs of each field.*

[Beyond Formal University Technology Transfer: Innovative Pathways for Knowledge Exchange](#)

CS Hayter, E Rasmussen, JH Rooksby - The Journal of Technology Transfer, 2018

*University technology transfer is often associated with formal transmission of science-based inventions, for instance through the licensing of patented technology to a firm. Formal conceptions of technology transfer limit our ability to understand fully how scientific knowledge evolves into industrial and social application. In this introductory article, we discuss how knowledge is shared and accessed across boundaries, and argue for a broader conceptualization including the transfer, translation, and transformation of knowledge. This view underlies a necessary conceptual shift from formal technology transfer to a more encompassing conception of pathways for knowledge exchange. We discuss promising avenues for extending research on university technology transfer relating to broadening the set of pathways considered, exploring the interplay of pathways, examining new pathways, including broader outcomes and impacts, and methodological challenges in measuring knowledge exchange.*

### [Influencing and Measuring Behaviour in Crowdsourced Activities](#)

SJJ Gould, AL Cox, DP Brumby - *New Directions in Third Wave Human-Computer ...*, 2018

*Crowdsourcing psychometric data is common in areas of Human-Computer Interaction (HCI) such as information visualization, text entry, and interface design. In some of the social sciences, crowdsourcing data is now considered routine, and even standard. In this chapter, we explore the collection of data in this manner, beginning by describing the variety of approaches can be used to crowdsource data. Then, we evaluate past literature that has compared the results of these approaches to more traditional data-collection techniques. From this literature, we synthesize a set of design and implementation guidelines for crowdsourcing studies. Finally, we describe how particular analytic techniques can be recruited to aid the analysis of large-scale crowdsourced data. The goal of this chapter it to clearly enumerate the difficulties of crowdsourcing psychometric data and to explore how, with careful planning and execution, these limitations can be overcome.*

### [Bring Them Aboard: Rewarding Participation in Technology-Mediated Citizen Science Projects](#)

F Cappa, J Laut, L Giustiniano - *Computers in Human Behavior*, 2018

*Citizen science involves the general public in research activities that are conducted in collaboration with professional scientists. In these projects, citizens voluntarily contribute to the research aims set forward by the scientists through the collection and analysis of large datasets, without a preliminary technical background required. While advancements in information technology have facilitated the involvement of the general public in citizen science through online platforms, several projects still fail due to limited participation. This paper investigates the feasibility of using selected reward mechanisms to positively influence participation and motivations to contribute in a technology-mediated citizen science project. More specifically, we report the results of an empirical study on the effects of monetary and public online acknowledgement rewards. Our results suggest that both reward mechanisms could crowd-in participants in technology-mediated citizen science projects. With this study, we seek to lay the foundations for a private-collective research model, where the focus is the intensification of participation in technology-mediated citizen science projects.*

### [What Motivates the Crowd?: A Literature Review on Motivations for Crowdsourcing](#)

A Amrollahi, MH Ahmadi - *Crowdsourcing and Knowledge Management in ...*, 2019

*The main objective of the chapter is to provide an insight into the motivation mechanisms for the crowd to participate in crowdsourcing projects. For this to happen, the authors investigate the factors which have been suggested in the literature as influencing the motivation of the crowd and the task type in each study in the related literature and contrasted the motivation factors in various contexts. The systematic literature review method has been used for the purpose of this study. This involved a comprehensive search in five scientific databases which resulted in 575 papers. This initial pool of studies has been refined in various rounds and ended in identification of 37 studies which directly targeted the topic of motivation in crowdsourcing. The study introduces various categories of motivations and investigates the factors which have been utilized in each context. Finally, possible implications for practice and potential research gaps are discussed.*

### [Should We Simulate Mental Models to Assess Whether They Agree?](#)

EA Lavin, PJ Giabbanelli, AT Stefanik, SA Gray... - *Proceedings of the Annual ...*, 2018

*Modeling with citizen scientists: using community-based modeling tools to develop citizen science projects. Modeling approaches can support policy coherence by capturing the logistics of an intervention involving multiple individuals, or by identifying goals and preferences of each individual. An important intermediate step is to identify agreement among individuals. This may be achieved through intensive qualitative methods such as interviews, or by automatically comparing models. Current comparisons are limited as they either assess whether individuals think of the same factors, or see the same causal connections between factors. Systems science suggests that, to test whether individuals really share a paradigm, we should mobilize their whole models. Instead of comparing their whole models through multiple simulation scenarios, we suggested using network centrality. We performed experiments on mental models from 264 participants in the context of fishery*

management. Our results suggest that if stakeholder groups agree on the central factors (per Katz centrality), they also tend to agree on simulation outcomes and thus share a paradigm.

[PDF] [The Potential for Scientific Outreach and Learning in Mechanical Turk Experiments](#)  
E Jun, M Arian, K Reinecke - 2018

**Примечание:** в статье получен неожиданный результат. Выявлены мотивация и долгосрочное вовлечение участников проектов Механического Турка. А ведь считалось, что участники МТ это слабомотивированные участники преимущественно из стран третьего мира, работающие за скромное вознаграждение и находящиеся в постоянном конфликте с менеджерами и заказчиками.

*The global reach of online experiments and their wide adoption in fields ranging from political science to computer science poses an underexplored opportunity for learning at scale: the possibility of participants learning about the research to which they contribute data. We conducted three experiments on Amazon's Mechanical Turk to evaluate whether participants of paid online experiments are interested in learning about research, what information they find most interesting, and whether providing them with such information actually leads to learning gains. Our findings show that 40% of our participants on Mechanical Turk actively sought out post-experiment learning opportunities despite having already received their financial compensation. Participants expressed high interest in a range of research topics, including previous research and experimental design. Finally, we find that participants comprehend and accurately recall facts from post-experiment learning opportunities. Our findings suggest that Mechanical Turk can be a valuable platform for learning at scale and scientific outreach*

[PDF] [Harnessing the Wisdom of the Crowd in the Evaluation of Innovative Ideas](#)  
J Du - 2018

*The voting system in this study provides the foundation on which the evolution of social networks and social influences in crowd-based evaluation can be examined. In this paper, I aim to explore which criterion, or a set of criteria, contribute to the popularity of an innovative idea in a crowd. So far there is no consensus as to what constitute a good innovative idea. Therefore, a set of five criteria regarding the quality of innovative ideas are proposed and subsequently tested on their effect on the choice made by the crowd: clarity, originality, creativity, feasibility, and (visual) attractiveness. Second, I test whether democratize the decision-making power to the vast majority (e.g.: the crowd) is indeed a reliable strategy, when it comes to evaluate the potential of early-stage projects that are yet fuzzy and uncertain (e.g.: innovative ideas). More specifically, I investigate whether and to what extent the social factors are at play in crowd-based evaluation. Based on a unique dataset collected over a period of three years, most of the hypotheses are confirmed.*

[HTML] [Predicting Population Trends Using Citizen Science Data: do Subsampling Methods Produce Reliable Estimates for Mammals?](#)  
K Callcutt, S Croft, GC Smith - European Journal of Wildlife Research, 2018

*Accurate assessment of population trends is invaluable in wildlife management, particularly for identifying species which are of conservation concern, and consequently, reliable cost-effective methods for their determination are highly desirable. In a recent papers, the authors apply a subsampling method, used in several studies to quantify population trends from citizen science data for butterflies, birds, and plants, to assess the status of West European hedgehogs (*Erinaceus europaeus*) in England. Whilst the findings may be in agreement with expert opinion, we argue that this type of approach does not adequately account for spatial bias common in mammal data and that without further evaluation it is unclear whether the result is reliable or simply coincidental. To explore this concern, we apply the method across a range of terrestrial mammal species and compare the resulting trends to other published studies.*

[Crowdsourcing as an Analytical Method: Metrology of Smartphone Measurements in Heritage Science.](#)

R Brigham, J Grau-Bove, A Rudnicka, M Cassar... - *Angewandte Chemie*, 2018

*This research assesses the precision, repeatability, and accuracy of crowdsourced scientific measurements, and whether their quality is sufficient to provide usable results. Measurements of colour and area were chosen because of the possibility of producing them with smartphone cameras. The quality of the measurements was estimated experimentally by comparing data contributed by anonymous participants in heritage sites with reference measurements of known accuracy and precision. Participants performed the measurements by taking photographs with their smartphones, from which colour and dimensional data could be extracted. The results indicate that smartphone measurements provided by citizen scientists can be used to measure changes in colour, but that the performance is strongly dependent on the measured colour coordinate. The same method can be used to measure areas when the difference in colour with the neighbouring areas is large enough. These results render the method useful in some heritage science contexts, but higher precision would be desirable.*

[HTML] [Innovation Management and Crowdsourcing: a Quantitative Analysis of Sponsor and Crowd Assessments](#)

KT Jones - 2018

*Crowdsourcing is an increasingly common method used for new product development in large engineering-focused companies. While effective at generating a large number of ideas, previous research has noted that there is not an efficient mechanism to sort ideas based on the sponsor's desired outcomes. Without such a mechanism, the sponsor is left to evaluate ideas individually in a labor-intensive effort. This paper evaluates the extent to which information revealed by the crowd during the course of a crowdsourcing event can be used to accurately predict sponsor selection of submitted ideas. The praxis reviews current literature relevant to new product development, innovation management, and crowdsourcing as well as methods for efficient sorting. Using a quantitatively-based methodology, the author develops and evaluates several predictive models using various attributes of the crowd reaction to crowdsourced ideas. Ultimately, the praxis proposes a model that can significantly reduce the burden of sorting through submissions and determining the submissions which merit further review.*

[Quality Criteria for Citizen Science Projects on Österreich forscht Version 1.1](#)

F Heigl, D Dörler, P Bartar, R Brodschneider... - 2018

*The platform Österreich forscht ([www.citizen-science.at](http://www.citizen-science.at)) was founded in 2014 with the objectives of (1) connecting citizen science actors in Austria, (2) providing the broadest possible overview of citizen science projects in Austria, and (3) scientifically advancing citizen science as a method. Following the initiative of the platform Österreich forscht, many of the institutions that are active in citizen science joined forces in the Citizen Science Network Austria in 2017, and thus agreed to advance the quality of citizen science in Austria (<http://www.citizen-science.at/the-platform/the-network>).*

[Scientific Discourse of Citizen Scientists: Models as a Boundary Object for Collaborative Problem Solving](#)

J Huang, CE Hmelo-Silver, R Jordan, S Gray... - *Computers in Human ...*, 2018

*In this study, we examine the nature of scientific discourse among participants enrolled in two citizen science projects as they engage in collaborative modeling and problem solving. Specifically, we explore the nature of their conversation as they use, the Mental Modeler, an online collaborative modeling tool to facilitate science engagement, systems-thinking and reasoning. This paper applies an analytical approach that uses visual representations and the discourse around building these representations to understand the shifts in scientific discourse and interpret complex interaction patterns between participants and facilitators in the computer-based learning environment. Findings suggest that the Mental Modeler serves as a boundary object that empowers participants and facilitators to collaboratively engage with scientific topics*

and practices through the development of scientific discourse and deeper learning in problem solving contexts.

[\[HTML\] A Science Products Inventory for Citizen-Science Planning and Evaluation](#)

A Wiggins, R Bonney, G LeBuhn, JK Parrish, JF Weltzin - BioScience, 2018

*Citizen science involves a range of practices involving public participation in scientific knowledge production, but outcomes evaluation is complicated by the diversity of the goals and forms of citizen science. Publications and citations are not adequate metrics to describe citizen-science productivity. We address this gap by contributing a science products inventory (SPI) tool, iteratively developed through an expert panel and case studies, intended to support general-purpose planning and evaluation of citizen-science projects with respect to science productivity. The SPI includes a collection of items for tracking the production of science outputs and data practices, which are described and illustrated with examples.*

[Integrating Social Good into CS Education](#)

DH Fisher, J Cameron, T Clegg, S August - ... Symposium on Computer Science ..., 2018

*Computing for social good has become a common topic in computing circles, with professional organizations and conferences sponsoring discussions on the relevance of "social good" material for computer science research and for education.*

[The Development of a Participatory Assessment Technique for Infrastructure: Neighborhood-Level Monitoring Towards Sustainable Infrastructure Systems](#)

MD Hendricks, MA Meyer, NG Gharaibeh, S Van Zandt... - Sustainable Cities and ..., 2018

*Climate change and increasing natural disasters coupled with years of deferred maintenance have added pressure to infrastructure in urban areas. Thus, monitoring for failure of these systems is crucial to prevent future impacts to life and property. Participatory assessment technique for infrastructure provides a community-based approach to assess the capacity and physical condition of infrastructure. Furthermore, a participatory assessment technique for infrastructure can encourage grassroots activism that engages residents, researchers, and planners in the identification of sustainable development concerns and solutions. This paper explains the development of the participatory assessment technique for infrastructure that can provide empirical data about the condition of infrastructure at the neighborhood-level, using stormwater systems in a vulnerable neighborhood in Houston, Texas as a case study. This paper argues for the opportunity of participatory methods to address needs in infrastructure assessment and describes the ongoing project testing the best use of these methods.*

[Assessing Motivations and Use of Online Citizen Science Astronomy Projects](#)

M Nona Bakerman, S Buxner, G Bracey, N Gugliucci - American Astronomical Society ..., 2018

*The exponential proliferation of astronomy data has resulted in the need to develop new ways to analyze data. Recent efforts to engage the public in the discussion of the importance of science has led to projects that are aimed at letting them have hands-on experiences. Citizen science in astronomy, which has followed the model of citizen science in other scientific fields, has increased in the number and type of projects in the last few years and poses captivating ways to engage the public in science. The primary feature of this study was citizen science users' motivations and activities related to engaging in astronomy citizen science projects. We report on participants' interview responses related to their motivations, length and frequency of engagement, and reasons for leaving the project. In particular, we looked at if and how motivations have changed for those who have engaged in the projects in order to develop support for and understand participants of citizen science. The predominant reasons participants took part in citizen science were: interest, helping, learning or teaching, and being part of science. Everyone interviewed demonstrated an intrinsic motivation to do citizen science projects. Participants' reasons for ending their engagement on any given day were: having to do other things, physical effects of the computer, scheduled event that ended, attention span or tired,*

computer or program issues. A small fraction of the participants also indicated experiencing negative feedback.

### [Participatory Design of Citizen Science Experiments](#)

E Senabre, N Ferran-Ferrer, J Perelló - *Comunicar*, 2018

*This article describes and analyzes the collaborative design of a citizen science research project through co-creation. Three groups of secondary school students and a team of scientists conceived three experiments on human behavior and social capital in urban and public spaces. The study goal is to address how interdisciplinary work and attention to social concerns and needs, as well as the collective construction of research questions, can be integrated into scientific research. The 95 students participating in the project answered a survey to evaluate their perception about the dynamics and tools used in the co-creation process of each experiment, and the five scientists responded to a semi-structured interview. The results from the survey and interviews demonstrate how citizen science can achieve a “co-created” modality beyond the usual “contributory” paradigm, which usually only involves the public or amateurs in data collection stages. This type of more collaborative science was made possible by the adaptation of materials and facilitation mechanisms, as well as the promotion of key aspects in research such as trust, creativity and transparency. The results also point to the possibility of adopting similar co-design strategies in other contexts of scientific collaboration and collaborative knowledge generation.*

### [Epistemology Beyond the Brain](#)

LK Weissenberger, JM Budd, KR Herold - ... of the Association for Information Science ..., 2017

*Recent and emerging viewpoints in embodiment and knowledge necessitate a reexamination of epistemology within and beyond the brain. Taking a sociocultural approach, this article covers two main types of epistemology beyond the brain, namely, embodied epistemology and nonindividualist epistemology. Using citizen science and music to illustrate related concepts of intuition, experience, and embodiment, this article describes intuition as a cultural system, beyond a purely individual possession. We describe how—in cultural practices such as music—intuition acts as mediator between knowledge and embodiment, and intuition is built and modified by experience over time. As information research becomes increasingly interested in the role of the body and its relationship to information, knowledge, intuition, and memory, we argue that such an approach will uncover further dimensions of nonindividualist, systemic, and embodied knowledge.*

### [Crowd Vigilante Detecting Sabotage in Crowdsourcing](#)

M Bano, D Zowghi - *4th Asia Pacific Requirements Engineering Symposium ...*, 2018

*Crowdsourcing is a complex and sociotechnical problem solving approach for collaboration of geographically distributed volunteer crowd to contribute to the achievement of a common task. One of the major issues faced by crowdsourced projects is the trustworthiness of the crowd. This paper presents a vision to develop a framework with supporting methods and tools for early detection of the malicious acts of sabotage in crowdsourced projects by utilizing and scaling digital forensic techniques.*

### [\[PDF\] Never Too Old, Cold or Dry to Watch the Sky: A Survival Analysis of Citizen Science Volunteerism](#)

SA SHEPPARD, J TURNER, J THEBAULT-SPIEKER... - 2017

*CoCoRaHS is a multinational citizen science project for observing precipitation. Like many citizen science projects, volunteer retention is a key measure of engagement and data quality. Through survival analysis, we found that participant age (self-reported at account creation) is a significant predictor of retention. Compared to all other age groups, participants aged 60-70 are much more likely to sign up for CoCoRaHS, and to remain active for several years. We also measured the influence of task difficulty and the relative frequency of rain, finding small but statistically significant and counterintuitive effects. Finally, we confirmed previous work showing that participation levels within the first month are highly predictive of eventual retention. We conclude*

with implications for observational citizen science projects and crowdsourcing research in general.

### [Co-designing Technologies for Citizen Scientist Engagement & Saving Species](#)

JL Oliver, M Cottman-Fields, M Brereton, P Roe - ... of the 29th Australian Conference on ..., 2017

*This full-day workshop will explore how human computer interaction (HCI) design approaches can expand, diversify, and improve ways that members of the public engage with nature and science to help save species as citizen scientists. Prospective participants are to submit proposals discussing either a new project, enhancements to an existing project, or an HCI topic relevant to citizen science engagement (eg interaction designs, methods, theories).*

### [\[PDF\] Live Sketch: Video-driven Dynamic Deformation of Static Drawings](#)

Q Su, X Bai, H Fu, CL Tai, J Wang - 2018

*Creating sketch animations using traditional tools requires special artistic skills, and is tedious even for trained professionals. To lower the barrier for creating sketch animations, we propose a new system, Live Sketch, which allows novice users to interactively bring static drawings to life by applying deformation-based animation effects that are extracted from video examples. Dynamic deformation is first extracted as a sparse set of moving control points from videos and then transferred to a static drawing. Our system addresses a few major technical challenges, such as motion extraction from video, video-to-sketch alignment, and many-to-one motiondriven sketch animation. While each of the sub-problems could be difficult to solve fully automatically, we present reliable solutions by combining new computational algorithms with intuitive user interactions. Our pilot study shows that our system allows both users with or without animation skills to easily add dynamic deformation to static drawings.*

### [Bayesian Estimation of Species Relative Abundances and Habitat Preferences Using Opportunistic Data](#)

C Coron, C Calenge, C Giraud, R Julliard - Environmental and Ecological Statistics, 2018

*We develop a new statistical procedure to monitor relative species abundances and their respective preferences for different habitat types, using opportunistic data. We combine the opportunistic data with some standardized data in order to correct the bias inherent to the opportunistic data collection. Species observations are modeled by Poisson distributions whose parameters quantify species abundances and habitat preferences, and are estimated using Bayesian computations. Our main contributions are (i) to tackle the bias induced by habitat selection behaviors, (ii) to handle data where the habitat type associated to each observation is unknown, (iii) to estimate probabilities of selection of habitat for the species. As an illustration, we estimate common bird species habitat preferences and abundances in the region of Aquitaine (France).*

### [Who's "Hooting"? Motivations and Scientific Attitudes of Manitoban Citizen Science Owl Surveyors](#)

C Ng, J Duncan, N Koper - Avian Conservation and Ecology, 2018

*Citizen science is gaining popularity as a means for all persons to participate in and contribute to scientific projects, and can increase our understanding of avian conservation and ecology by facilitating the collection of more data. Understanding the type of person who participates in citizen science projects, including their motivations, behaviors, and gains, allows researchers to better recruit and retain participants and to design enjoyable and educational projects with direct and indirect benefits to conservation and science. We surveyed participants of the Manitoba Nocturnal Owl Survey, an ongoing 25-year-old citizen science project, to evaluate how and why people participated and to determine their relationship with science and ecology. The interpersonal dimensions of surveying was important at all stages of participation, affecting recruitment, participation, and reasons for leaving. Marketing citizen science projects as social learning opportunities embedded in nature may help attract and retain more volunteers, ensuring long-term sustainability of programs while engaging new participants in activities that increase their ecological knowledge and awareness.*

[How Training Citizen Scientists Affect the Accuracy and Precision of Phenological Data](#)  
 RE Feldman, I Žemaitė, AJ Miller-Rushing - International Journal of Biometeorology, 2018

*Monitoring plant and animal phenology is a critical step to anticipating and predicting changes in species interactions and biodiversity. Because phenology necessarily involves frequent and repeated observations over time, citizen scientists have become a vital part of collecting phenological data. However, there is still concern over the accuracy and precision of citizen science data. It is possible that training citizen scientists can improve data quality though there are few comparisons of trained and untrained citizen scientists in the ability of each to accurately and precisely measure phenology. We assessed how three types of observers - experts, trained citizen scientists that make repeated observations, and untrained citizen scientists making once-per-year observations - differ in quantifying temporal change in flower and fruit abundance of American mountain ash and arthropods. We found that trained more so than untrained citizen science observers over- or under-estimated abundances leading to precise but inaccurate characterizations of phenological patterns. Our results suggest a new type of bias induced by repeated observations: A type of learning takes place that reduces the independence of observations taken on different trees or different dates. Thus, in this and many other cases, having individuals make one-off observations of marked plants may produce data as good if not better than individuals making repeated observations. For citizen science programs related to phenology, our results underscore the importance of (a) attracting the most number of observers possible even if they only make one observation, (b) producing easy-to-use and informative data sheets, and (c) carefully planning effective training programs that are, perhaps, repeated at different points during the data collection period.*

## **Платформы научного краудсорсинга и ПО для его поддержки**

Быстрое развитие проектов научного краудсорсинга связано с новыми информационно-коммуникационными технологиями. Проекты используют специализированные платформы (для пользователя они выглядят, как web-порталы) и специализированное программное обеспечение. Образцом для подражания является платформа Zooniverse, которая первоначально обслуживала проект Galaxy Zoo, а теперь является самостоятельной структурой и обеспечивает краудсорсинговые проекты в различных областях.

Следует отметить, что проекты добровольческих вычислений (volunteer computing), предполагающих, что участники лишь предоставляют свободное время своих компьютеров, продолжают развиваться, но их «звездный час» видимо, прошёл. Классическим примером такого проекта является SETI@home («поиск внеземных цивилизаций на дому»), построенный на платформе Berkeley Open Infrastructure for Network Computing (BOINC). Многие из проектов, обсуждаемых в работах данного раздела, по-прежнему опираются на платформу BOINC, но их содержание меняется.

Проекты платформы Zooniverse предъявляют к творческой стороне участников более серьезные требования.

Также, в работах последних лет обращают на себя внимание разработки принципиально новых образовательных открытых платформ, таких, как Massive Open Online Courses (MOOCs). Это доступные всем он-лайновые обучающие курсы, связанные с распределенными проектами.

[Participatory Noise Mapping: Harnessing the Potential of Smartphones Through the Development of a Dedicated Citizen-Science Platform](#)

EA King, A Tatoglu, RD Celmer - ASME 2017 International Mechanical Engineering ..., 2017

*This paper presents results of an ongoing project which aims to develop a purpose-built platform for using smart phones as alternative to sound level meters for citizen-science based environment noise assessment. In order to manage and control environmental noise effectively, the extent of the problem must first be quantified. Across the world, strategic noise maps are used to assess the impact of environmental noise in cities. Traditionally, these maps are developed using predictive techniques, but some authors have advocated the use of noise measurements to develop more reliable and robust noise maps. If adopted correctly, smartphones have the capability to revolutionize the manner in which environmental noise assessments are performed. The development of smartphone technology, and its impact on environmental noise studies, has recently begun to receive attention in the academic literature. Recent research has assessed the capability of existing smartphone applications (apps) to be utilized as an alternative low-cost solution to traditional noise monitoring. Results show that the accuracy of current noise measurement apps varies widely relative to pre-specified reference levels.*

[Augmentedworld: Facilitating the Creation of Location-Based Questions](#)

M Barak, S Asakle - Computers & Education, 2018

*We present AugmentedWorld, an open and adaptive location-based platform, designed to facilitate the creation of multimedia-rich questions while connecting scientific topics to relevant locations, real-world applications, and learners' daily life. Prior to its implementation in schools, we conducted a study among 98 prospective science teachers to examine the quality of location-based questions and participants' epistemic views. Data were collected through encoding of questions' quality, participants' grades, and semi-structured interviews. The findings indicated medium results for the quality of location-based questions, with multimedia design as the weakest feature. The participants' early experience in exam-writing and gender were found as significant predictors of the quality of questions. In addition, the data indicated a significant relationship between the questions' quality and participants' technological and pedagogical knowledge. Four competencies were identified with reference to the educational importance of location-based questions: contextualization, creativity, critical thinking, and information and communication technology (ICT) literacy. The current study underlines the importance of location-based questions as a form of learning and alternative assessment.*

[Reflections on the Potential of Virtual Citizen Science Platforms to Address Collective Action Challenges: Lessons and Implications for Future Research](#)

C Leeuwis, KJ Cieslik, MNC Aarts, A Dewulf, F Ludwig... - NJAS-Wageningen Journal ..., 2018

*Based on the case-studies, we conclude that many collective action challenges are of a more complex nature than originally anticipated, and often cannot be resolved within clearly demarcated communities. While this complicates the realization of Ostrom's communication and information-related design principles and community features, there may still be a meaningful role for digital citizen science platforms. To help address complex challenges, they must be oriented towards fostering adaptive and systemic learning across interdependent stakeholder communities, rather than focusing on the self-betterment of the communities alone. Such digital platforms need to be developed in a responsible manner that ensures [complementarity](#) with already existing patterns of communication and ICT-use, that anticipates dynamics of trust and distrust among interdependent stakeholders, and that prevents typical problems associated with the sharing of information such as privacy infringement and undesirable control over information by outsiders.*

[Learning at Scale](#)

I Roll, DM Russell, D Gašević - International Journal of Artificial Intelligence in ..., 2018

*Learning at Scale is a fast growing field that affects formal, informal, and workplace education. Highly interdisciplinary, it builds on solid foundations in the learning sciences, computer science, education,*

*and the social sciences. We define learning at scale as the study of the technologies, pedagogies, analyses, and theories of learning and teaching that take place with a large number of learners and a high ratio of learners to facilitators. The scale of these environments often changes the very nature of the interaction and learning experiences. We identify three types of technologies that support scale in education: dedicated content-agnostic platforms, such as MOOCs; dedicated tools, such as Intelligent Tutoring Systems; and repurposed platforms, such as social networks. We further identify five areas that scale affects: learners, research and data, adaptation, space and time, and pedagogy. Introducing the papers in this special issue on the topic, we discuss the characteristics, affordances, and promise of learning at scale.*

### [Citizen Social Lab: A Digital Platform for Human Behaviour Experimentation within a Citizen Science Framework](#)

J Vicens, J Perelló, J Duch - arXiv preprint arXiv:1807.00037, 2018

*Cooperation is one of the behavioral traits that define human beings, however we are still trying to understand why humans cooperate. Behavioral experiments have been largely conducted to shed light into the mechanisms behind cooperation and other behavioral traits. However, most of these experiments have been conducted in laboratories with highly controlled experimental protocols but with varied limitations which limits the reproducibility and the generalization of the results obtained. In an attempt to overcome these limitations, some experimental approaches have moved human behavior experimentation from laboratories to public spaces, where behaviors occur naturally, and have opened the participation to the general public within the citizen science framework. Given the open nature of these environments, it is critical to establish the appropriate protocols to maintain the same data quality that one can obtain in the laboratories. Here, we introduce Citizen Social Lab, a software platform designed to be used in the wild using citizen science practices. The platform allows researchers to collect data in a more realistic context while maintaining the scientific rigour, and it is structured in a modular and scalable way so it can also be easily adapted for online or brick-and-mortar experimental laboratories. Following citizen science guidelines, the platform is designed to motivate a more general population into participation, but also to promote engaging and learning of the scientific research process. We also review the main results of the experiments performed using the platform up to now, and the set of games that each experiment includes. Finally, we evaluate some properties of the platform, such as the heterogeneity of the samples of the experiments and their satisfaction level, and the parameters that demonstrate the robustness of the platform and the quality of the data collected.*

### [Crowdcloud: A Crowdsourced System for Cloud Infrastructure](#)

M Hosseini, CM Angelopoulos, WK Chai, S Kundig - Cluster Computing, 2018

*The widespread adoption of truly portable, smart devices and Do-It-Yourself computing platforms by the general public has enabled the rise of new network and system paradigms. This abundance of wellconnected, well-equipped, affordable devices, when combined with crowdsourcing methods, enables the development of systems with the aid of the crowd. In this work, we introduce the paradigm of Crowdsourced Systems, systems whose constituent infrastructure, or a significant part of it, is pooled from the general public by following crowdsourcing methodologies. We discuss the particular distinctive characteristics they carry and also provide their “canonical” architecture. We exemplify the paradigm by also introducing Crowdcloud, a crowdsourced cloud infrastructure where crowd members can act both as cloud service providers and cloud service clients. We discuss its characteristic properties and also provide its functional architecture. The concepts introduced in this work underpin recent advances in the areas of mobile edge/fog computing and co-designed/cocreated systems.*

### [Crowdsourced Information Technology Content for Education and Employment](#)

K Moudgalya - 2018 IEEE 18th International Conference on Advanced ..., 2018

*Textbook Companion is a useful documentation approach that can be produced effectively through crowdsourcing of students and faculty members. Although extrinsic motivation is the driving factor, we cannot rule out the existence of intrinsic motivation. Scilab and Python textbook companions are found to be useful to their creators and to the community. To achieve success in more challenging*

projects, such as DWSIM flowsheeting, eSim circuit simulation and OpenFOAM case study, increasing the levels of motivation is proposed. Enhancing the access to laptops will increase the size and quality of the crowd, which is indispensable for the crowdsourcing to succeed.

### [Quanti.us: a Tool for Rapid, Flexible, Crowd-Based Annotation of Images](#)

AJ Hughes, JD Mornin, SK Biswas, LE Beck, DP Bauer... - *Nature methods*, 2018

We describe *Quanti.us*, a crowd-based image-annotation platform that provides an accurate alternative to computational algorithms for difficult image-analysis problems. We used *Quanti.us* for a variety of medium-throughput image-analysis tasks and achieved 10–50× savings in analysis time compared with that required for the same task by a single expert annotator. We show equivalent deep learning performance for *Quanti.us*-derived and expert-derived annotations, which should allow scalable integration with tailored machine learning algorithms.

### [The Crowd Storms the Ivory Tower](#)

ML Jones, H Spiers - *Nature Methods*, 2018

*Quanti.us* is a platform that allows large-scale manual image annotation by a distributed workforce through Amazon's Mechanical Turk crowdsourcing marketplace.

### [Development and Evaluation of Using a Mobile Application as a Demonstration Tool for Outreach to Inform and Educate Farmers, Academia, and the Community of ...](#)

C Fink, B Liu, F Easton, C Krintz, R Wolski... - *2018 ASABE Annual ...*, 2018

Agricultural stewardship is the careful utilization of agricultural and natural resources to prevent depletion. Development and use of a smart device mobile application educates schools, farmers, and the community about farm stewardship and environmental conservation on the farm. The goal is educating farmers, academia, and community members, of farming sustainably today, and for the future. People are equipped with smartphones and tablets, whether in the classroom, on the farm, downtown in the office, or anywhere they go. With these devices available, a mobile app can be utilized to encourage and foster agricultural stewardship and sustainable farming. A fact of life is people need food to live, and to continue to produce the amount of food needed to feed all people, sustainable farming practices are needed. A mobile application is developed and is used to teach academia, farmers, and community members about sustainable farming and stewardship practices. The app is used as a tool to aid people in farming sustainably, teaching agricultural stewardship, and teaching environmental conservation.

### [BYOD Supported Crowd Interaction System](#)

S Deba, H Singh, BL Rohini, D Mishra, RK Meena... - *Procedia Computer Science*, 2018

Crowd is a large gathering of people, mostly in unorganized manner. The conventional crowd interaction systems for opinion acceptability is driven from the retrieval mechanisms of the crowd data using Verbal or Non-verbal means. The Verbal communication from the crowd leads to chaotic situation where the chances of data loss is quite higher with no privacy. The non-verbal interaction leads to a more efficient method of data retrieval as it bounds the unwanted noise and provides better security measures to the system. In this work it is proposed a BYOD supported non verbal crowd interaction framework that can provide an instant user feedback in situations like public speaking, live concert or class room teaching learning. The user's own device interface prompts with a quick response code, that work as a transient identity and an intermediary optical link for exchanging responses. The proposed system also effective for mobile supported pervasive data exchange with optical marker as trigger and security. The experiments and anecdotal results depict a higher level of user satisfaction that paves a way for furthermore technology driven enhancements in the cost effective crowd interaction systems.

[\[HTML\] Designing Citizen Science Tools for Learning: Lessons Learnt from the Iterative Development of Nquire](#)

C Herodotou, M Aristeidou, M Sharples, E Scanlon - *Research and Practice in ...*, 2018

*This paper reports on a 4-year research and development case study about the design of citizen science tools for inquiry learning. It details the process of iterative pedagogy-led design and evaluation of the nQuire toolkit, a set of web-based and mobile tools scaffolding the creation of online citizen science investigations. The design involved an expert review of inquiry learning and citizen science, combined with user experience studies involving more than 200 users. These have informed a concept that we have termed 'citizen inquiry', which engages members of the public alongside scientists in setting up, running, managing or contributing to citizen science projects with a main aim of learning about the scientific method through doing science by interaction with others. A design-based research (DBR) methodology was adopted for the iterative design and evaluation of citizen science tools. DBR was focused on the refinement of a central concept, 'citizen inquiry', by exploring how it can be instantiated in educational technologies and interventions. Eight design guidelines are proposed: users as producers of knowledge, topics before tools, mobile affordances, scaffolds to the process of scientific inquiry, learning by doing as key message, being part of a community as key message, every visit brings a reward, and value users and their time.*

[WeObserve: An Ecosystem of Citizen Observatories for Environmental Monitoring](#)

I Moorthy, S Fritz, L See, U Wehn, D Hemment, JM Pau... - 2018

*The last decade has witnessed a rise in the field of citizen science which can be described as a collaborative undertaking between citizens and scientists to help gather data and create new scientific knowledge. In the EU, efforts have been channeled into developing the concept of Citizen Observatories (COs), which have been supported via the Seventh Framework Program (FP7) and continue to be funded in Horizon 2020. COs, often supported by innovative technologies including Earth Observation (EO) and mobile devices, are the means by which communities can monitor and report on their environment and access information that is easily understandable for decision making. To improve the coordination between existing COs and related citizen science activities, the WeObserve project tackles three key challenges that face COs: awareness, acceptability and sustainability. The WeObserve mission is to create a sustainable ecosystem of COs that can systematically address these identified challenges and help move citizen science into the mainstream. The WeObserve approach will apply several key instruments to target, connect and coordinate relevant stakeholders.*

[FotoQuest Go: A citizen science tool for in-situ land use and land cover monitoring](#)

I Moorthy, T Sturn, D Fraisl, M Karner, JCL Bayas... - 2018

*Every three years, dating back to 2006, Eurostat conducts an exhaustive Land Use/Cover Area frame Survey (LUCAS), where professional surveyors visit approximately 270,000 locations across EU countries to acquire photos and record detailed in-situ information on land use/cover. This conventional approach to ground-based calibration/validation data acquisition is rather costly and is limited to detecting changes on a fixed 3-year cycle. As such, within the EU's Earth Observation (EO) monitoring framework, there is a need for low-cost solutions for acquiring high quality ground-based data to support the delivery of timely, accurate and well-validated environmental monitoring products. By leveraging the proliferation of mobile devices the FotoQuest Go mobile application offers a citizen-centric tool to mapping land use and land cover dynamics. FotoQuest Go engages citizens and crowdsources the needed information in a more participatory approach while directly complementing the LUCAS survey findings.*

[\[PDF\] Visualization Tool for Environmental Sensing and Public Health Data](#)

YC Hsu, J Cross, P Dille, I Nourbakhsh, L Leiter... - arXiv preprint arXiv ..., 2018

*To assist residents affected by oil and gas development, public health professionals in a non-profit organization have collected community data, including symptoms, air quality, and personal stories. However, the organization was unable to aggregate and visualize these data computationally. We present the Environmental Health Channel, an interactive web-based tool for visualizing*

environmental sensing and public health data. This tool enables discussing and disseminating scientific evidence to reveal local environmental and health impacts of industrial activities.

### [Crowdsourcing Platform: A Review for Governing Operating Model](#)

M Hussin, S Salimun - *Advanced Science Letters*, 2018

*In recent years, the emergence of crowdsourcing platform as a mediator in managing the intersection of business organization and human workforce via the Internet has paved way for business process to spur globally as it requires minimal cost expenditure and faster. However, due to its vast concept and applied in various directions and fields in research, it has led to an obscure limit. Hence, many believe that there are many opportunities still remain undiscovered. This paper aims to gain a better understanding of the governing operating model in crowdsourcing from the perspective of Information Communication and Technology and business process. We conducted a review and analyses of previous studies related to crowdsourcing platforms. Specifically, this paper deliberates on the main components in such model then analyzed the intersection between each component in order to facilitate dynamic changes in crowdsourcing operating platform. With such discovery, the governing operating model of crowdsourcing platform is hopefully can be further enhanced in the near future.*

### [\[PDF\] Automatic Data Gathering System for Social Dialog](#)

G Lee, Y Lim, J Choi - 2018

*In this paper, we propose a system that automatically acquires dialogue data from multiple users through Google form. The system works through the interaction of the automation server and the Google API. The user enters a conversation on the system, and the server continuously collects the conversation by providing the collected conversations back to the other user. Currently, it is still under development, but we are going to add social factors such as the situation of the dialogue in the near future.*

### [\[PDF\] Dataset Review—Zooniverse, the online repository for Citizen Science](#)

P Manning - *Journal of World-Systems Research*, 2018

*This review focuses on Zooniverse projects in History, Social Sciences, and Humanities. They are relatively small in number, but they benefit from Zooniverse staff support and certain of them have become very successful. Those to be discussed briefly in this review include “League of Nations in the digital age,” “Fossil Finder,” “Old Weather,” “Scribes of the Cairo Geniza,” “Plastic Tide,” and “Shakespeare’s World.” These projects address widely varying topics within history, social science, and humanities, with time frames ranging from the immediate present to early human evolution.*

### [SpaghettiLens: A Software Stack for Modeling Gravitational Lenses by Citizen Scientists](#)

R Küng - *Astronomy and Computing*, 2018

*The 2020s are expected to see tens of thousands of lens discoveries. Mass reconstruction or modeling of these lenses will be needed, but current modeling methods are time intensive for specialists and expert human resources do not scale. SpaghettiLens approaches this challenge with the help of experienced citizen scientist volunteers who have already been involved in finding lenses. A top level description is as follows. Citizen scientists look at data and provide a graphical input based on Fermat’s principle which we call a Spaghetti Diagram. This input is followed by the generation of the model, which is a compute intensive task done server side though a task distribution system. Model results are returned in graphical form to the citizen scientist, who examines and then either forwards them for forum discussion or rejects the model and retries. As well as configuring models, citizen scientists can also modify existing model configurations, which results in a version tree of models and makes the modeling process collaborative. SpaghettiLens is designed to be scalable and could be adopted to problems with similar characteristics. It is licensed under the MIT license, released at <http://labs.spacewarps.org> and the source code is available at <https://github.com/RafiKueng/SpaghettiLens>.*

[\[PDF\] A Software System Proposing the Processing of Crowdsourced Data to Monitor a Flood Event: An AI Approach](#)

AT Gupta - Open Water Journal, 2018

*We present Fics (Fetch information through crowdsourcing), a platform that is ready-to-take posts from social media platforms and infers the water heights referred in them. These posts are expected to come from the citizens who are witnessing a flood event in real time. Fics corrects the spacing in the string, translates the string into corresponding mathematical notations and then finally compute the water heights from the posts. The objective of Fics is to provide such a platform that can be used for the citizens from the data received from them only, without making them use a software which is to be installed on their machines separately. Fics employs Artificial Intelligence to infer the required values (water heights) from the posts. Fics ignores the invalid input strings.*

[SPLASSH: A Collaborative Web-Based Application That Crowdsources Environmental Data in Real Time](#)

LG Adams, JN Mwaniki, SJ Dabdoub, MG Adams - Marine Technology Society ..., 2018

*SPLASSH (Student Programs Like Aquatic Science Sampling Headquarters, <https://splash.org>) is a collaborative web-based application that crowdsources environmental data in real time. Originally launched in 2014, SPLASSH beta version 1.0 was designed to showcase water projects conducted by students. Through its development, it has broadened its reach from students to educators (formal and informal), researchers, resource managers, science professionals, and the public (citizen scientists). SPLASSH's beta version 2.0 (Patent Pending) has an innovative, customizable environmental tracker and project management capabilities that foster community building through collaboration. SPLASSH offers the public an opportunity to contribute more than just data to an existing project. It encourages citizens to play a lead role by initiating their own projects, truly validating and broadening the definition of citizen science. Learning and project outcomes will be measured for their impact and effectiveness.*

[\[PDF\] Authentic Community Based Learning in New York City: an Holistic Model using the Billion Oyster Project and Curriculum and Community Enterprise for Restoration Science](#)

L Birney, D McNamara - Journal of Education and Human Development, 2017

*A model that exemplifies the constructivist approach to learning by connecting the students with their community is the Billion Oyster Project which has been established in New York City. This place-based learning model is multidisciplinary, experiential and is situated in a community that is home to 8.5 million humans and countless numbers of aquatic and other terrestrial organisms. As its name implies, the focus of the Billion Oyster Program is to introduce a billion oysters back into New York Harbor. A Herculean endeavor in and of itself but then couple this with the connections to the citizens of the city of New York and the educational goals it has created and the extensiveness of the project can be realized.*

[\[PDF\] CITI-SENSE Citizens' Observatories Architecture](#)

HY Liu, AJ Berre, MJ Kobernus, M Fredriksen... - 2018

*This paper introduces the architecture of the CITI-SENSE Citizens' Observatories based on the ISO 19119 reference model. It describes the various parts of the architecture including boundary services with sensors and apps and data management services with the CITISENSE data model. It also describes the Web Feature Service (WFS) storage support and the reusable visualisation widgets used for both apps and web portals in various Citizens' Observatories.*

[VIVO: a Secure, Privacy-Preserving and Real-Time Crowd-Sensing Framework for the Internet of Things](#)

L Luceri, F Cardoso, M Papandrea, S Giordano... - 2018

*Smartphones are a key enabling technology in the Internet of Things (IoT) for gathering crowd-sensed data. However, collecting crowd-sensed data for research is not simple. Issues related to device heterogeneity, security, and privacy have prevented the rise of crowd-sensing platforms for*

scientific data collection. For this reason, we implemented VIVO, an open framework for gathering crowd-sensed Big Data for IoT services, where security and privacy are managed within the framework. VIVO introduces the enrolled crowd-sensing model, which allows the deployment of multiple simultaneous experiments on the mobile phones of volunteers. The collected data can be accessed both at the end of the experiment, as in traditional testbeds, as well as in real-time, as required by many Big Data applications. We present here the VIVO architecture, highlighting its advantages over existing solutions, and four relevant real-world applications running on top of VIVO.

[\[HTML\] Defining Principles for Mobile Apps and Platforms Development in Citizen Science](#)  
U Sturm, S Schade, L Ceccaroni, M Gold, C Kyba... - Research Ideas and ..., 2018

Apps for mobile devices and web-based platforms are increasingly used in citizen science projects. While extensive research has been done in multiple areas of studies, from Human-Computer Interaction to public engagement in science, we are not aware of a collection of recommendations specific for citizen science that provides support and advice for planning, design and data management of mobile apps and platforms that will assist learning from best practice and successful implementations. In two workshops, citizen science practitioners with experience in mobile application and web-platform development and implementation came together to analyse, discuss and define recommendations for the initiators of technology based citizen science projects. Many of the recommendations produced during the two workshops are applicable to citizen science project that do not use mobile devices to collect data. Therefore, we propose to closely connect the results presented here with ECSA's Ten Principles of Citizen Science.

[Federating Natural Language Question Answering Services of a Cognitive Enterprise Data Platform](#)

JM Boyer - ... Annual International Conference on Computer Science ..., 2017

An enterprise data lake (EDL) combines big data storage, governance, and query abilities for structured and unstructured data with a navigable, searchable data catalogue. We define a cognitive enterprise data platform (CEDP) to be an EDL that is further equipped with a scalable deployment platform and an extensible catalogue of deployable cognitive computing services as well as a data science and data engineering environment to develop and train the cognitive computing services and publish them to the CEDP catalogue. A natural language question answering (NLQA) service is a CEDP cognitive computing service trained to recognize natural language questions and respond using CEDP data queries or cognitive computing services. In order to scale this form of cognition to the enterprise, business units must be able to crowd source the catalogue of trained NLQA that the CEDP must then deploy and federate automatically. However, the machine learned models that contribute to answer confidence values are separately trained, so the answer confidence values from any two NLQA services are not directly comparable. Therefore, federating separately trained NLQA services requires an answer ranking methodology.

[A Collaborative Citizen Science Platform for Real-Time Volunteer Computing and Games](#)

P Yadav, I Charalampidis, J Cohen, J Darlington... - IEEE Transactions on ..., 2018

Volunteer computing (VC) or distributed computing projects are common in the citizen cyberscience (CCS) community and present extensive opportunities for scientists to make use of computing power donated by volunteers to undertake large-scale scientific computing tasks. VC is generally a noninteractive process for those contributing computing resources to a project, whereas volunteer thinking (VT) or distributed thinking allows volunteers to participate interactively in CCS projects to solve human computation tasks. In this paper, we describe the integration of three tools, the Virtual Atom Smasher (VAS) game developed by CERN, LiveQ, a job distribution middleware, and CitizenGrid, an online platform for hosting and providing computation to CCS projects. This integration demonstrates the combining of VC and VT to help address the scientific and educational goals of games like VAS. This paper introduces the three tools and provides details of the integration process along with further potential usage scenarios for the resulting platform.

[\[HTML\] A Case Study in Citizen Science: The Effectiveness of a Trap-Neuter-Return Program in a Chicago Neighborhood](#)

DD Spehar, PJ Wolf - *Animals*, 2018

*The use of trap-neuter-return (TNR) as a method of managing free-roaming cat populations has increased in the United States in recent decades. Historically, TNR has been conducted most often at a grassroots level, which has led to inconsistent data collection and assessment practices. Consequently, a paucity of analyzable data exists. An initiative is underway to standardize TNR program data collection and assessment. However, it could be some time before scientifically sound protocols are implemented on a broad scale. In the interim, sets of data collected by nascent citizen scientists offer valid opportunities to evaluate grassroots TNR programs. The purpose of the present study was to examine the effectiveness of a TNR program conducted by a citizen scientist located in Chicago, Illinois, where a county law permitting TNR was enacted in 2007. Colony populations, when grouped by the number of years enrolled in the program, declined by a mean of 54% from entry and 82% from peak levels. Results from coexistent TNR programs in the Chicago area are consistent with these findings.*

[Conservation by Algorithm](#)

WM Adams - *Oryx*, 2018

*Conservation by algorithm is powerful, but without involvement of people on the ground it is unlikely that solutions identified by algorithm will work. The fieldworker who makes ecological observations, the farmer or hunter who knows how the seasons change, the water collector or firewood gatherer, are all essential to intelligent conservation solutions. Effective conservation grows from the engagement of human minds and hands. However impatient we are, we have to accept that there really isn't an app for that.*

[Systems and methods for machine learning enhanced by human measurements](#)

D Cox, W Scheirer, S ANTHONY, K Nakayama - *US Patent App. 15/702,809*, 2018

*In various embodiments, training objects are classified by human annotators, psychometric data characterizing the annotation of the training objects is acquired, a human-weighted loss function based at least in part on the classification data and the psychometric data is computationally derived, and one or more features of a query object are computationally classified based at least in part on the human-weighted loss function.*

[Risk and resilience in an uncertain world](#)

VH Dale, HI Jager, AK Wolfe, RA Efronymson - *Frontiers in Ecology and the ...*, 2018

*The ecologists are using new tools for detecting environmental change at different temporal, spatial, and organizational scales. For instance, the development of smartphones has led to an explosion of information sharing via apps and citizen-science initiatives .*

[Citizen Science at the Borders of Romance](#)

Q Groom, H Engledow, A Bogaerts, NV Pereira... - *... Information Science and ...*, 2018

*Currently, there are few non-English transcription platforms for citizen science. This is why in Belgium we built [DoeDat](#), from the [Digivol](#) system of the Atlas of Living Australia. We will be demonstrating DoeDat and its multilingual features. We will explain how we enter translations, both for the user interface and for the dynamic parts of the website. We will share our experiences of running a multilingual site and the challenges it brings. Translating and running such a website requires skilled personnel and patience. However, our experience has been positive and the number and quality of our volunteer transcriptions has been rewarding. We look forward to the further use of DoeDat to transcribe data in many other languages. There are no reasons anymore to exclude willing volunteers in any language.*

### [Crowd-sourced event identification that maintains source privacy](#)

DC Mumme, RM McGraw, RA MacDonald - US Patent App. 15/658,315, 2018

*An automated method that generates crowd-sourced event notifications includes: retrieving sensor data from mobile devices; detecting events based on the retrieved sensor data; and generating a set of summary nodes based on the events, where each summary node is associated with multiple events. A system that generates crowd-sourced event notifications includes: multiple mobile devices, each having at least one sensor, each mobile device identifies events using calculations based on sensor data and generates a notification for each identified event; and an analytics server that generates a set of summary nodes based on the identified events, each summary node associated with multiple events. An automated method that generates event notifications includes: retrieving sensor data; calculating a set of statistical values based on the sensor data; comparing the statistical values to at least one threshold; and generating an event notification when the threshold is exceeded by any of the statistical values.*

### [Developing mobile applications for environmental and biodiversity citizen science: considerations and recommendations](#)

S Luna, M Gold, A Albert, L Ceccaroni, B Claramunt... - Multimedia Tools and ..., 2018

*The functionality available on modern 'smartphone' mobile devices, along with mobile application software and access to the mobile web, have opened up a wide range of ways for volunteers to participate in environmental and biodiversity research by contributing wildlife and environmental observations, geospatial information, and other context-specific and time-bound data. This has brought about an increasing number of mobile phone based citizen science projects that are designed to access these device features (such as the camera, the microphone, and GPS location data), as well as to reach different user groups, over different project durations, and with different aims and goals. In this chapter we outline a number of key considerations when designing and developing mobile applications for citizen science, with regard to (1) Interoperability. The factors that influence the usability of the mobile application are covered in both (2) Participant Centred Design and Agile Development, and (3) User Interface and Experience Design. Finally, the factors that influence sustained engagement in the project are covered in (4) Motivational Factors for Participation.*

## **Научный краудсорсинг и вопросы научной политики**

Добровольческая неформальная научная деятельность привлекает внимание органов, ответственных за формирование научной политики различных стран. Считается, что мерой признания проектов распределенных исследований станет не утвердившаяся экзотическая стратегия научной деятельности, а успешная интеграция таких проектов в существующую научную практику.

### [\[PDF\] Peers or Professionals?](#)

S Ranchordás - European Competition and Regulatory Law Review, 2018

*For almost a decade, digital peer-to-peer initiatives (eg, Uber, Airbnb) have been disrupting the traditional economy by offering informal, diverse, convenient and affordable services to consumers. However, more recently, the peer-to-peer economy has become increasingly professionalised. Service providers in the ride and home-sharing sectors feel significant pressure to offer services similar to those of professionals, practise the low or high prices suggested by algorithmic pricing tools, and show at all times professionalism. This shift towards professionalisation has been accompanied by regular information exchanges between service providers and platforms as well as by the growing use of algorithmic pricing. This article analyses first the evolution of the sharing economy from a peer-to-peer system that benefited from initial regulatory leniency due to its sustainable and informal goals, to a quasi-professional*

economy where users are driven by profit making and the need to receive excellent rating and reviews.

[\[PDF\] A key moment for European Science Policy](#)

N Mejgaard, R Woolley, C Bloch, S Buehrer... - Journal of Science ..., 2018

*We argue that the commitment to science-society integration and Responsible Research and Innovation in past European framework programmes has already made considerable progress in better aligning research and innovation with European societies. The framework programmes have important socialisation effects and recent research point to positive trends across key areas of Responsible Research and Innovation within academic organisations. What appears to be a step away from the concerted efforts to facilitate European citizens' meaningful contribution to research and innovation in the upcoming Horizon Europe framework programme seems counter-productive and poorly timed. Carlos Moedas, the current Commissioner for R&I in Europe, has consistently voiced his support for citizen science and a preference for an open model of science that brings stakeholders more fully into the fold of R&I.*

[\[PDF\] The utopia of the technological revolution](#)

FJ García-Peñalvo - 2018

*This paper is important for the educational of current primary and secondary students, which will be the professionals of the near future. 21st century citizens will require computational thinking skills to understand the world in which they live and the artefacts they will find in their daily life. To do that, moreover than having significant and interesting debates, we propose also they develop research projects, playing a main role, using a citizen science approach.*

[Citizen science, public policy](#)

CJ Guerrini, MA Majumder, MJ Lewellyn, AL McGuire - Science, 2018

*Citizen science initiatives that support collaborations between researchers and the public are flourishing. As a result of this enhanced role of the public, citizen science demonstrates more diversity and flexibility than traditional science and can encompass efforts that have no institutional affiliation, are funded entirely by participants, or continuously or suddenly change their scientific aims. But these structural differences have regulatory implications that could undermine the integrity, safety, or participatory goals of particular citizen science projects. Thus far, citizen science appears to be addressing regulatory gaps and mismatches through voluntary actions of thoughtful and well-intentioned practitioners. But as citizen science continues to surge in popularity and increasingly engage divergent interests, vulnerable populations, and sensitive data, it is important to consider the long-term effectiveness of these private actions and whether public policies should be adjusted to complement or improve on them. Here, we focus on three policy domains that are relevant to most citizen science projects: intellectual property (IP), scientific integrity, and participant protections.*

[Citizen Engagement in Science: Impressions from an International Workshop on Citizen Science](#)

J Kenens, M Van Oudheusden, G Verschraegen... - EASST Review, 2018

*At the international workshop "(Un)taming citizen science – Policies, Practices, People", held at KU Leuven, scholars, policy makers, and science journalists discussed and explored citizen science initiatives in Europe and Japan. As citizen science concepts and processes make inroads into science policies and institutions, they create unique opportunities for public participation in scientific research and for the democratization of science.*

[Increasing Crowd Science Projects in Japan: Case Study of Online Citizen Participation](#)

E Ono, Y Ikkatai, T Enoto - International Journal of Institutional Research and ..., 2018

*Scientific activities driven by citizens who are not specialists in the field are traditionally called "citizen science" contrary to conventional science, which is limited to professional researchers. Recent developments of web-based information and communication technology (ICT) have further changed*

*methods and styles of citizen science. This new generation of web-based citizen science is referred to as “crowd science” in this study. Crowd science projects have gradually been launched in Japan as web-based data-collection and data-processing projects. However, what factors mainly contribute to success or failure of these Japanese projects is yet to be investigated. In this article, six Japanese crowd science projects are classified and surveyed on the basis of online citizen participation. We found that “super-volunteers,” who are enthusiastic members of the project, are suggested to become key players for the growth of the project, and that online discussion forums have played a major role in enhancing participants’ communication.*

[Toward Understanding Law and Exploration: Citizen Science, Technology and Regulation](#)  
A Brett - 2018

*This dissertation consists of a series of case studies that explore the relationship between law and scientific exploration, focusing on how these fields interact to co-create emerging methods of collecting baseline environmental data. It is analyzed how data is used, addressing the legal barriers to the use of citizen science data in law and policy decision-making. The findings are synthesized to argue that emerging methods in scientific exploration have an important role to play in remedying widespread environmental monitoring failures, but that these will only be useful if attention is paid to the legal system in which they operate.*

[\[HTML\] Innovation in Citizen Science—Perspectives on Science-Policy Advances](#)  
S Hecker, R Bonney, M Haklay, F Hölker, H Hofer... - Citizen Science: Theory and ..., 2018

**Примечание: имеет смысл отслеживать деятельность Европейской ассоциации науки граждан (ECSA)**

*Citizen science is growing as a field of research with contributions from diverse disciplines, promoting innovation in science, society, and policy. Inter- and transdisciplinary discussions and critical analyses are needed to use the current momentum to evaluate, demonstrate, and build on the advances that have been made in the past few years. This paper synthesizes results of discussions at the first international citizen science conference of the European Citizen Science Association (ECSA) in 2016 in Berlin, Germany, and distills major points of the discourse into key recommendations. To enhance innovation in science, citizen science needs to clearly demonstrate its scientific benefit, branch out across disciplines, and foster active networking and new formats of collaboration, including true co-design with participants. From a society angle it is crucial to engage with societal actors in various formats that suit participants and to evaluate two-way learning outcomes as well as to develop the transformative role of science communication. These key perspectives will promote citizen science progress at the science-society-policy interface.*

[The Analysis of Leadership in Russian Scientific Sphere](#)  
L Goncharenko, S Sybachin, I Savchenko - ... for the Future Sustainable Development of ..., 2018

**Примечание. Большая редкость: применение науки граждан обсуждается в российском контексте**

*The paper is dedicated to the analysis of the condition of the Russian scientific sphere. After the breakup of the Soviet Union, science was in stagnation because of numerous problems such as lack of systematization, bad conditions for scientists’ work, and many others. To solve those problems nowadays, funding has been increased, additional motivational factors have been added, and measures have been implemented to decrease corruption in scientific sphere. According to forecast, in 2019–2020 condition of science will improve, and Russia will strengthen its positions in the global ratings. This article covers the issues of establishment of the Russian science and presents generalized data in graph forms. These days, citizen science plays an important role in the development of scientific sphere as many discoveries are made by nonprofessionals.*

## [Back to the Future? Aims and Ends for Future – Oriented Science Education Policy – the New Zealand Context](#)

J Gilbert - Knowledge Cultures, 2017

*Science and science education are a focus of high-level government policy settings in many countries. Greater public interest in and knowledge of science is seen as being an important prerequisite for economic growth and social development in the Knowledge Age. In this article, I argue that current policy approaches are misguided and potentially harmful – for science, for education, and for future social development. Using specific examples from the New Zealand context, I argue that, because these policies are based on widely held but limited views of first, education, and second, science, they effectively colonise, rather than expand, the possibilities for our future. Drawing on ideas from educational thinkers of the past, such as John Dewey and Alfred North Whitehead, and ideas from contemporary futures thinkers, I put forward for consideration three very different scenarios for science education’s future aims and ends.*

## [Citizen Science, Public Policy](#)

CJ Guerrini, MA Majumder, MJ Lewellyn, AL McGuire - Science, 2018

*Citizen science initiatives that support collaborations between researchers and the public are flourishing. As a result of this enhanced role of the public, citizen science demonstrates more diversity and flexibility than traditional science and can encompass efforts that have no institutional affiliation, are funded entirely by participants, or continuously or suddenly change their scientific aims. But these structural differences have regulatory implications that could undermine the integrity, safety, or participatory goals of particular citizen science projects. Thus far, citizen science appears to be addressing regulatory gaps and mismatches through voluntary actions of thoughtful and well-intentioned practitioners. But as citizen science continues to surge in popularity and increasingly engage divergent interests, vulnerable populations, and sensitive data, it is important to consider the long-term effectiveness of these private actions and whether public policies should be adjusted to complement or improve on them. Here, we focus on three policy domains that are relevant to most citizen science projects: intellectual property (IP), scientific integrity, and participant protections.*

## [Intellectual Property and Clean Energy: The Paris Agreement and Climate Justice](#)

M Rimmer - 2018

*This collection considers the future of climate innovation after the Paris Agreement. It analyses the debate over intellectual property and climate change in a range of forums – including the climate talks, the World Trade Organization, and the World Intellectual Property Organization, as well as multilateral institutions dealing with food, health, and biodiversity. The book investigates the critical role patent law plays in providing incentives for renewable energy and access to critical inventions for the greater public good, as well as plant breeders’ rights and their impact upon food security and climate change. Also considered is how access to genetic resources raises questions about biodiversity and climate change. This collection also explores the significant impact of trademark law in terms of green trademarks, eco labels, and greenwashing. The key role played by copyright law in respect of access to environmental information is also considered. The book also looks at deadlocks in the debate over intellectual property and climate change, and provides theoretical, policy, and practical solutions to overcome such impasses.*

## **Crowdsourced data. Open science. Open sources. “Big Data”**

Сбор и упорядочение данных – важнейшая часть любого распределенного добровольческого проекта. Организация процесса сбора данных зачастую определяет успех или провал проекта. В работах 2017-18 гг, приведенных в этом разделе, встречается большое число новых терминов и аббревиатур.

Большие данные (*big data*) – обозначение структурированных и [неструктурированных данных](#) огромных объемов и значительного многообразия. Массив данных подпадает под

понятие больших данных, если удовлетворяет критерию «трёх V» (*volume, velocity, variety*). Добровольцы пользуются сверхмассивами и пополняют их. Менеджеры проектов отмечают, что при увеличении массива данных повышается риск проникновения в массив низкокачественной информации. Тем не менее, признано, что, зачастую, единственно возможным источником сверхмассива является проект гражданской науки.

Открытая наука (*open science*) — обширная концепция, предполагающая, что научные исследования, данные и их распространение должны быть доступными для всех уровней заинтересованного общества, будь то любители или профессионалы. запросы общества на доступ к научному знанию стали столь велики, что возникла необходимость того, чтобы группы учёных делились ресурсами друг с другом с тем, чтобы они могли проводить исследования коллективно. У концепции есть сторонники и противники.

Мы не даем оценки этим новым реалиям нашей жизни, однако отметим, что в приведенных ниже работах авторы рассматривают их в тесной увязке с развитием добровольческих сетевых проектов.

### [Overview of Data Storing Techniques in Citizen Science Applications](#)

J Musto, A Dahanayake - *European Conference on Advances in Databases and ...*, 2018

*Interest in citizen science and the number of related projects have increased considerably during the last decade. Citizen science revolves around gathering data and using it. This means, that data storing is a vital part of any citizen science project and can affect the success or failure. Many researches focus on the citizen side, while the data side is often left out. This study aims to fill the gap by trying to find the current data storing practices in the field of citizen science. Results show that most projects used a traditional relational database to store data, a separate web interface to add, use, modify, and access the data, and data validation was left to users by having them vote on existing data. Data models always considered the data provider (citizen) but left out the end user in their design.*

### [\[PDF\] Open Science for Early-Career Researchers](#)

G O'Neill - *Impact*, 2018

*Open Science consists of a mix of different practices and we cannot expect that early career researchers (ECRs) can and should be trained in all of these practices. Some essential skills that we find important are general knowledge of Open Science and specific knowledge of research integrity. The implementation of Open Science is fundamental to the 'New Vision for Europe' concept. Open Science will be the new way of conducting research by opening up access to research data and results via new digital technologies and collaborative tools. Open Science is actually just one policy initiative of a threefold strategy to fundamentally open up research and innovation in Europe. Open Innovation will bring new actors into the innovation process, creating new products, markets and entrepreneurship*

### [\[HTML\] Democratizing Health Research Through Data Cooperatives](#)

A Blasimme, E Vayena, E Hafen - *Philosophy & Technology*, 2018

*Massive amounts of data are collected and stored on a routine basis in virtually all domains of human activities. Such data are potentially useful to biomedicine. Yet, access to data for research purposes is hindered by the fact that different kinds of individual-patient data reside in disparate, unlinked silos. We propose that data cooperatives can promote much needed data aggregation and consequently accelerate research and its clinical translation. Data cooperatives enable direct control over personal data, as well as more democratic governance of data pools. This model can realize a specific kind of data economy whereby citizens and communities are empowered to steer data use according to their motivations, preferences, and concerns. Policy makers can promote this model by recognizing citizens' rights to access and to obtain a copy of their own data, and by funding distributed data infrastructures piloting new data aggregation models.*

[\[PDF\] Crowd-Sourced Visual Data Collection for Monitoring Indoor Construction in 3D](#)  
F AMER, M GOLPARVAR-FARD - 2018

*Complete and accurate 3D monitoring of indoor construction progress using visual data is challenging. It requires (a) capturing a large number of overlapping images, which is time-consuming and labor-intensive to collect, and (b) processing using Structure from Motion (SfM) algorithms, which can be computationally expensive. To address these inefficiencies, this paper proposes a hybrid SfM-SLAM 3D reconstruction algorithm along with a decentralized data collection workflow to map indoor construction work locations in 3D and any desired frequency. The hybrid 3D reconstruction method is composed of a pipeline of Structure from Motion (SfM) coupled with Multi-View Stereo (MVS) to generate 3D point clouds and a SLAM (Simultaneous Localization and Mapping) algorithm to register the separately formed models together.*

[Big Data Demystified: How to Use Big Data, Data Science and AI to Make Better Business Decisions and Gain Competitive Advantage](#)  
D Stephenson - 2018

*The term 'big data' refers to a new class of data: vast, rapidly accumulating quantities, which often do not fit a traditional structure. The term 'big' is an understatement that simply does not do justice to the complexity of the situation. The data we are dealing with is not only bigger than traditional data; it is fundamentally different, as a motorcycle is more than simply a bigger bicycle and an ocean is more than simply a deeper swimming pool. It brings new challenges, presents new opportunities, blurs traditional competitive boundaries and requires a paradigm shift related to how we draw tangible value from data. The ocean of data, combined with the technologies that have been developed to handle it, provide insights at enormous scale and have made possible a new wave of machine learning, enabling computers to drive cars, predict heart attacks better than physicians and master extremely complex games such as Go better than any human.*

[\[PDF\] Harnessing the Flow of Data](#)  
G Gunn, M Stanley - 2018

*Low-cost sensors have broadened the scope of who can conduct environmental monitoring. Citizen science is the practice of engaging the public on scientific or research questions to gather robust information about human behaviour or natural systems.*

[Emerging Technologies: IoT, Big Data, and CPS with Sensory Systems](#)  
Q Tan, N El-Bendary, MA Bayoumi, X Zhang, J Sedano... - Journal of Sensors, 2018

*This collection of studies is focused on a three-legged stand in which now is focused on the research community: the internet of things (IoT), the cyber-physical systems (CPS), and the data-driven knowledge extraction based on big data. The availability of uniquely addressable heterogeneous electronic (UAHE)—including sensors, actuators, smart devices, RFID tags, embedded computers, and mobile devices—is continuously growing day by day. From a networking perspective, the IoT relies on interconnected UAHE for creating a mesh of devices, producing information, and building a worldwide network of real physical objects. In this context, the IoT presents a technology that enables loosely coupled decentralized systems of cooperating smart objects of autonomous physical-digital devices, augmented with sensing/actuating, processing, and networking capabilities.*

[\[PDF\] Scaling Collaborative Open Data Science](#)  
MJ Smith - 2018

*Large-scale, collaborative, open data science projects have the potential to address important societal problems using the tools of predictive machine learning. However, no suitable framework exists to develop such projects collaboratively and openly, at scale. In this thesis, I discuss the deficiencies of current approaches and then develop new approaches for this problem through systems, algorithms, and interfaces. A central theme is the restructuring of data science projects into scalable, fundamental units of contribution. I focus on feature engineering, structuring contributions as*

*the creation of independent units of feature function source code. Within this context, I discuss paths forward for collaborative data science.*

[Can Charismatic Megafauna Be Surrogate Species for Biodiversity Conservation? Mechanisms and a Test Using Citizen Data and a Hierarchical Community Model](#)

Y Yamaura, M Higa, M Senzaki, I Koizumi - *Biodiversity Conservation Using Umbrella ...*, 2018

*Charismatic megafauna are a conservation concern and a flagship of conservation for many other species in the practice of biodiversity conservation. However, some studies support the roles of charismatic megafauna while others do not. In this chapter, we review the ecological mechanisms of why charismatic megafauna can be surrogate species. Citizen data are promising for testing this hypothesis; however, they are usually collected in a spatially biased manner, which hampers their usage. Here we analyzed citizen data with a hierarchical community model accounting for sampling processes and bird species richness at different resolutions.*

[Systems Thinking and Complexity Science and the Relevance of Big Data Analytics, Intelligence Functions, and Simulation Models](#)

SE Bibri - *Smart Sustainable Cities of the Future*, 2018

*Smart sustainable cities are complex systems par excellence. This is manifested in a variety of ways to think of and define the underlying many subsystems as connected and joined together by a web of relationships that interact to produce collective behavior that cannot easily be explained in terms of interactions between the individual constituent elements. As such, they involve special conundrums, intractable problems, and complex challenges pertaining to sustainability and urbanization. It follows that to deal with such systems requires newfangled ways founded on more innovative solutions and sophisticated methods with respect to how cities can be monitored, understood, managed, planned, and developed. This necessitates leveraging the advance and prevalence of ICT in the transition toward the needed sustainable urban development in an increasingly urbanized and computerized world. Importantly, smart sustainable cities require advanced thinking approaches to be well understood and illuminated so as to enable more effective actions necessary for enhancing their functioning and adaptation in ways that guide their development toward sustainability. Discussed is the potential of big data analytics and related urban intelligence functions and urban simulation models for, and the role of urban design in, catalyzing and advancing the strategic process of sustainable development by proposing innovative approaches and solutions for monitoring, managing, planning, and designing smart sustainable cities of the future.*

[Data Science for Urban Sustainability: Data Mining and Data-Analytic Thinking in the Next Wave of City Analytics](#)

SE Bibri - *Smart Sustainable Cities of the Future*, 2018

*As a research direction, big data analytics has recently attracted scholars and scientists from diverse disciplines, as well as practitioners from a variety of professional fields, given their prominence in various urban domains, especially urban design and planning, transportation engineering, mobility, energy, public health, and socioeconomic forecasting. Indeed, there has recently been much enthusiasm about the immense possibilities created by the data deluge and its new sources to better operate, manage, and plan cities to improve their contribution to the goals of sustainable development as a result of thinking about and understanding sustainability problems in a data-analytic fashion. Big data analytics is indeed offering many new opportunities for well-informed decision-making and enhanced insights with respect to our knowledge of how fast and best to improve urban sustainability. This unprecedented shift has been brought up by data science, an interdisciplinary field which involves scientific systems, processes, and methods used to extract useful knowledge from data in structured or unstructured forms. Data mining and knowledge discovery in databases as processes are by far the most widely used techniques for extracting useful knowledge from colossal datasets for enhanced decision-making and insights in relation predominantly to business intelligence.*

[\[PDF\] Intelligent Tour Planning System Using Crowd Sourced Data](#)  
MSU Miah, M Masduzzaman, W Sarkar, HMM Islam... - 2018

*To observe the beauty of nature and to visit various places around the world, a vast number of tourists visit different countries and many tourist attraction sites now-a-days. But Most of the tourist places have failed to introduce itself as a tourist destination to the visitor due to lack of proper information and proper guideline to visit there. This paper tries to focus on some problems in the tourism industry and try to solve those problems using crowd sourced data with some customized algorithms. Some of the main problems are the lack of information about a destination tourist spot, combination on budget to visit the spot, time of travels etc. We proposed a customize algorithm which will provide maximum suggestion to visit a place with nearest all sub place based on user destination within their given budget and time. Using our method, user can choose the most suitable plan for them to visit those places.*

[\[PDF\] Comparing Outlier Detection Methods to Improve the Quality of Citizen Science Data](#)  
JSM Li - 2018

*Citizen science is the public participation in research, usually through volunteer monitoring or data collection. Data collected by citizen scientists is a valuable resource in many fields of research that require long-term observations across broad spatial scales. However, such data may not be as accurate as those collected by trained professionals. The objective of this thesis is to analyze the reliability of individual observers and observations to enhance the data quality of a citizen science network that has recorded plant phenology (bloom times) since 1987 across Alberta to track biological response to environmental change. This study evaluates several algorithms designed to detect outlier observations and inconsistent observers.*

[\[PDF\] Implementing Open Science: Strategies, Experiences and Models](#)  
S Leonelli - 2018

*Prioritise public engagement in Open Science activities, including citizen science initiatives, engaging members of the public in research planning and assessment, and the inclusion of diverse sources of expertise in academic research.*

[Data Collaboration and Participation for Sustainable Development Goals — a Case for Engaging Community-Based Organizations](#)  
M Thinyane, L Goldkind, HI Lam - Journal of Human Rights and Social Work, 2018

*This paper adopts an ecosystem perspective and considers the collaborative role and the intermediary (towards participation of the civil society) function that community-based organizations (CBOs) stand to play with regard to addressing the societal problems as framed within the United Nations 2030 Agenda for Sustainable Development. Using a case study approach, pilot data is presented, from research on a CBO that provides social services to diverse vulnerable population groups in Macau, SAR. This research highlights the unique positioning of the CBO to moderate participation of the marginalized populations groups, and to broker their potential for data collaboration with specific stakeholders within the sustainable development data ecosystem. The paper concludes with a discussion of the opportunities and challenges presented by creating spaces for citizen SDG data reporting and recommendations for adopting existing human rights reporting mechanisms for this purpose.*

[\[PDF\] Crowdsourcing and Its Applications on Data Mining: A Brief Survey](#)  
K Karthika, RD Devi - 2018

*Crowdsourcing allows large-scale and flexible invocation of human input for data gathering and analysis, which introduces a new paradigm of data mining process. Traditional data mining methods often require the experts in analytic domains to annotate the data. However, it is expensive and usually takes a long time. Crowdsourcing enables the use of heterogeneous background knowledge from volunteers and distributes the annotation process to small portions of efforts from different contributions. This paper reviews the state-of-the-arts on the crowdsourcing for data mining in recent*

years. We first review the challenges and opportunities of data mining tasks using crowdsourcing, and summarize the framework of them. Then we highlight several exemplars works in each component of the framework, including question designing, data mining and quality control. Finally, we conclude the limitation of crowdsourcing for data mining and suggest related areas for future research.

[\[PDF\] "We Need More Data!" The Politics of Scientific Information for Water Governance in the Context of Hydraulic Fracturing](#)

ML Moore, K Shaw, H Castleden - *Water Alternatives*, 2018

*Proposed and actual developments of hydraulic fracturing, as a high-volume water user, have proven contentious in recent years. However, one point of agreement has emerged amongst all actors with regards to water use and hydraulic fracturing: we need more data. This consensus fits with a longstanding reification of the role of data in water governance, and yet we argue it hides a politically contested terrain. Based on a literature review, an empirical Delphi study and a workshop with a diverse array of participants from across Canada, we explore the data needs related to water governance and hydraulic fracturing. We then investigate three areas of deficiency that point to a lack of trust and oversight as well as the exclusion of community and Indigenous knowledge. We argue that in an era of neoliberal approaches to water governance, issues of trust, accountability and transparency all link back to a diminished role for data management within existing water governance arrangements. The challenge is that simply collecting more data will not help decision-makers navigate the complexity of water governance. Our findings suggest a growing call by participants for greater engagement by governments in data collection and knowledge management, new funding mechanisms for data collection and rethinking how and what to monitor if including multiple ways of knowing and values.*

[\[PDF\] Drafty: Enlisting Users to be Editors who Maintain Structured Data](#)

S Wallace, L Van Kleunen, M Aubin-Le Quere... - 2017

*Structured datasets are difficult to keep up-to-date since the underlying facts evolve over time; curated data about business financials, organizational hierarchies, or drug interactions are constantly changing. Drafty is a platform that enlists visitors of an editable dataset to become "user-editors" to help solve this problem. It records and analyzes user-editors' withinpage interactions to construct user interest profiles, creating a cyclical feedback mechanism that enables Drafty to target requests for specific corrections from user-editors. Our findings suggest that user-editors are approximately 3 times more likely to provide accurate corrections for data matching their interest profiles, and about 2 times more likely to provide corrections in the first place.*

[Using Edge-Clouds to Reduce Load on Traditional WiFi Infrastructures and Improve Quality of Experience](#)

L Lopes, PM Pinto Silva, R Martins, F Silva... - 2017

*Crowd-sourcing the resources of mobile devices is a hot topic of research given the game-changing applications it may enable. In this paper we study the feasibility of using edge-clouds of mobile devices to reduce the load in traditional WiFi infrastructures for video dissemination applications. For this purpose, we designed and implemented a mobile application for video dissemination in sport venues that retrieves replays from a central server, through the access points in the WiFi infrastructure, into a smartphone. The fan's smartphones organize themselves into WiFi-Direct groups and exchange video replays whenever possible, bypassing the central server and access points. We performed a real-world experiment using the live TV feed for the Champions League game Benfica-Besiktas with the help of a group of volunteers using the application at the student's union lounge.*

[\[PDF\] Floating Forests: Quantitative Validation of Citizen Science Data Generated From Consensus Classifications](#)

IS Rosenthal, JEK Byrnes, KC Cavanaugh, TW Bell... - arXiv preprint arXiv ..., 2018

*Large-scale research endeavors can be hindered by logistical constraints limiting the amount of available data. For example, global ecological questions require a global dataset, and traditional*

*sampling protocols are often too inefficient for a small research team to collect an adequate amount of data. Citizen science offers an alternative by crowdsourcing data collection. Despite growing popularity, the community has been slow to embrace it largely due to concerns about quality of data collected by citizen scientists. Using the citizen science project Floating Forests (<http://floatingforests.org>), we show that consensus classifications made by citizen scientists produce data that is of comparable quality to expert generated classifications. Floating Forests is a web-based project in which citizen scientists view satellite photographs of coastlines and trace the borders of kelp patches. Citizen science projects should implement methods such as consensus classification in conjunction with a quantitative comparison to expert generated classifications to avoid concerns about data quality.*

[Responsible Research and Innovation in Open Health and Open Science. Open Science: Open and Toll-Free Data Age Open Health](#)

F Ananasso, S Farruggia, R Provedel, M Sebillio - *Governance and Sustainability of ...*, 2018

*Some specific case studies are addressed—Open Health and Open Science—where Responsible Research and Innovation can play a crucial role and yield potential benefits, aiming at openness, transparency and sharing of relevant science and innovation efforts and outcomes. Open Science concerns access to outcomes of Science, circulation and use of results, development of scientific findings and breakthroughs. It implies open access, open data, open peer review and open licenses, which influence copyright, patents and transfer of knowledge. We explore a “Country case” (Italy). Open Health includes epidemiology, health data of geo-localized populations, open innovation, caring diseases. Here we deal with the topic “care”. Some people go beyond the patient-doctor exclusive relationship through unexpected resources and experiences, sharing medical records with the “crowd” to get ideas, perspectives, cures, experiences.*

[Earth Observation Open Science and Innovation](#)

PP Mathieu, M Borgeaud, YL Desnos, M Rast... - *IEEE Geoscience and ...*, 2018

*This book invites you to explore various elements of the big data revolution, addressing the development of Space 4.0, the new generation of data-driven research infrastructure (including the emergence of data cubes), new applications integrating IoT and EO, new business models in the emerging geo-sharing economy, new ways to support e-learning and digital education, new application of technologies such as cloud computing, artificial intelligence (AI), and deep learning, and the increasing role of new actors such as innovative startups, ICT corporates, data scientists and citizen scientists. By doing so, it aims to stimulate new ideas about how to make the most of EO and derived information in a rapidly changing environment.*

[Plant Genetic Resources for Food and Agriculture: Opportunities and Challenges Emerging From the Science and Information Technology Revolution](#)

M Halewood, T Chiurugwi, R Sackville Hamilton... - *New Phytologist*, 2018

*Over the last decade, there has been an ongoing revolution in the exploration, manipulation and synthesis of biological systems, through the development of new technologies that generate, analyse and exploit big data. Users of Plant Genetic Resources (PGR) can potentially leverage these capacities to significantly increase the efficiency and effectiveness of their efforts to conserve, discover and utilise novel qualities in PGR, and help achieve the Sustainable Development Goals (SDGs). We discuss potential responses to political and institutional challenges, ranging from options for enhanced structure and governance of research discovery platforms to internationally brokered benefit-sharing agreements, and identify a set of broad principles that could guide the global community as it seeks or considers solutions.*

[\[PDF\] Automated Data Quality Assessment for Citizen Science](#)

C Van Gheluwe - 2017

*In this work we attempt to identify the causes and impacts of data quality issues in general and for crowdsensing and citizen science projects in particular. Two case studies are performed on such projects to find and classify the causes of their data quality problems, as well as to suggest*

improvements where possible. The design of a new data management and processing platform based upon state-of-the-art technology is presented, along with a parsing and interpretation module that is meant to unify bicycle counting data originating from various sources. Finally we also look at how the Capability Maturity Model for continuous process improvement and project management can be a useful asset for data quality management.

[\[PDF\] A Review on Applications of Big Data for Disaster Management](#)

M Arslan, AM Roxin, C Cruz, D Gin hac - The 13th International Conference on ..., 2017

The term “disaster management” comprises both natural and man-made disasters. Highly pervaded with various types of sensors, our environment generates large amounts of data. Thus, big data applications in the field of disaster management should adopt a modular view, going from a component to nation scale. Current research trends mainly aim at integrating component, building, neighborhood and city levels, neglecting the region level for managing disasters. Current research on big data mainly address smart buildings and smart grids, notably in the following areas: energy waste management, prediction and planning of power generation needs, improved comfort, usability and endurance based on the integration of energy consumption data, environmental conditions and levels of occupancy.

[\[PDF\] Exploring Stereotypes and Biased Data With the Crowd](#)

Z Hu, J Strout - arXiv preprint arXiv:1801.03261, 2018

The goal of our research is to contribute information about how useful the crowd is at anticipating stereotypes that may be biasing a data set without a researcher’s knowledge. The results of the crowd’s prediction can potentially be used during data collection to help prevent the suspected stereotypes from introducing bias to the dataset. We conduct our research by asking the crowd on Amazon’s Mechanical Turk (AMT) to complete two similar Human Intelligence Tasks (HITs) by suggesting stereotypes relating to their personal experience. Our analysis of these responses focuses on determining the level of diversity in the workers’ suggestions and their demographics. Through this process we begin a discussion on how useful the crowd can be in tackling this difficult problem within machine learning data collection.

[A Web-Based Crowd Sourcing Data Application in Exploring the Effect of Collaborative We-Intention on Adoption of Cloud-Multimedia Drive](#)

YS Chen, JCL Chou, C Wu, HH Chu - International Journal of Applied Systemic ..., 2017

In modern multimedia data management, crowd sourcing and online collaboration are emerging ways of innovation and implementation for projects. Knowing why a group of people adopts a certain cloud-multimedia drive is the purpose of this research. In this research, besides the effect of usability which is the traditional cause of system adoption, the authors designed an 18 week long experiment to explore the effect of we-intention on adoption of cloud-multimedia drive. The result shows that we-intention is a cause of adoption, but if the effect of usability on adoption is controlled, we-intention seems to have little effect on adoption. Although usability remains the dominant factor, the exploration finds that we-intention can weaken the relationship between usability and adoption. The implication of this research is collective intention might substitute usability to some degree in system adoption, and managers could find ways more of social perspective to help system adoption.

[\[PDF\] Moving Towards Open Science?](#)

J Eriksson, C Lagvik, E Nolin - Nordic Perspectives on Open Science, 2018

The Conference on Open Access Scholarly Publishing, COASP, is held annually with the aim of reaching professional publishing organizations, independent publishers and university presses, as well as librarians, university administrators and other stakeholders. Here, we outline some themes and highlights from this year’s conference.

[\[PDF\] Collaborative Problem Solving in an Open-Ended Scientific Discovery Game](#)

A BAUER, Z POPOVIĆ - 2017

*Countless human pursuits depend upon collaborative problem solving, especially in complex, open-ended domains. As part of the growing technological support for such collaboration, an opportunity exists to design systems that actively guide and facilitate collaborative problem solving toward the most productive outcomes. A better understanding of the dynamics of open-ended collaboration on complex problems is needed to realize this opportunity. Motivated by this need for better understanding, we investigate the collaborative problem solving ecosystem of the scientific-discovery game Foldit. Our investigation is guided by two primary questions: how do the social aspects of Foldit impact an individual's behavior? and what factors have significant impact on group success? We find that collaboration and competition are associated with increased participation and that collaboration increases individual performance. We also find that measures of group skill, individual skill, and participation correlate with better group performance.*

[\[PDF\] Correcting for Bias in Distribution Modelling for Rare Species Using Citizen Science Data](#)

OJ Robinson, V Ruiz-Gutierrez, D Fink - Diversity and Distributions, 2017

*Aim is to improve the accuracy of inferences on habitat associations and distribution patterns of rare species by combining machine learning, spatial filtering and resampling to address class imbalance and spatial bias of large volumes of citizen science data.*

[\[HTML\] A Framework to Analyze Citizen Science Data for Volunteers, Managers, and Scientists](#)

J Toff, L Fore, T Hass, B Bennett, L Brubaker... - Citizen Science: Theory and ..., 2017

*The continuity of long-term environmental datasets provided by citizen science groups has the potential to address the specific concerns of multiple audiences. We designed an analysis framework based on a 16-year dataset across 40 sites in Puget Sound, WA, USA, which citizen scientists collected by visiting beaches annually and using prescribed protocols to record biodiversity, substrate, and slope. The framework was developed collaboratively by local citizens, agency managers, and academic scientists, incorporating objectives emphasized by each group while addressing overlapping appeal: (1) volunteers highlighted a natural history focus to analyze patterns of biotic and abiotic attributes; (2) managers highlighted a trend analysis to document changes through time; and (3) academic scientists highlighted an impact focus to analyze effects of habitat types and disturbances on biodiversity. This analysis had broad appeal across users, and we link how natural history, trend, and impact studies can be developed along spatial and temporal components to address multiple objectives and conservation goals.*

[Geocoding Tweets Based on Semantic Web and Ontologies](#)

I Escamilla, MT Ruíz, MM Ibarra, VL Soto, R Quintero... - ... , and Applications of ..., 2018

*Human ability to understand approximate references to locations, disambiguated by means of context and reasoning about spatial relationships, is the key to describe spatial environments and to share information about them. In this paper, we propose an approach for geocoding that takes advantage of the spatial relationships contained in the text of tweets, using semantic web, ontologies and spatial analyses. Microblog text has special characteristics (e.g. slang, abbreviations, acronyms, etc.) and thus represents a special variation of natural language. The main objective of this work is to associate spatial relationships found in text with a spatial footprint, to determine the location of the event described in the tweet. The feasibility of the proposal is demonstrated using a corpus of 200,000 tweets posted in Spanish related with traffic events in Mexico City.*

[\[PDF\] Impacts of Open Source Hardware in Science and Engineering](#)

JM Pearce - Bridge, 2017

*There is an opportunity to radically reduce the costs of experimental research while improving it by supporting the development of free and open source hardware (FOSH) for science and engineering.*

*By harnessing a scalable open source method, federal funding is spent just once for the development of scientific equipment and then a return on this investment is realized by direct digital replication of scientific devices for only the costs of materials.*

[\[HTML\] Increasing the Accuracy of Crowdsourced Information on Land Cover via a Voting Procedure Weighted by Information Inferred from the Contributed Data](#)

G Foody, L See, S Fritz, I Moorthy, C Perger, C Schill... - ISPRS International Journal ..., 2018

*Simple consensus methods are often used in crowdsourcing studies to label cases when data are provided by multiple contributors. A basic majority vote rule is often used. This approach weights the contributions from each contributor equally but the contributors may vary in the accuracy with which they can label cases. Here, the potential to increase the accuracy of crowdsourced data on land cover identified from satellite remote sensor images through the use of weighted voting strategies is explored. Critically, the information used to weight contributions based on the accuracy with which a contributor labels cases of a class and the relative abundance of class are inferred entirely from the contributed data only via a latent class analysis. The results show that consensus approaches do yield a classification that is more accurate than that achieved by any individual contributor.*

[The Future\(s\) of Open Science](#)

P Mirowski - Social Studies of Science, 2018

*Almost everyone is enthusiastic that 'open science' is the wave of the future. Yet when one looks seriously at the flaws in modern science that the movement proposes to remedy, the prospect for improvement in at least four areas are unimpressive. This suggests that the agenda is effectively to re-engineer science along the lines of platform capitalism, under the misleading banner of opening up science to the masses.*

[Opportunities and Challenges for Big Data Ornithology](#)

FA La Sorte, CA Lepczyk, JL Burnett, AH Hurlbert... - The Condor, 2018

*Recent advancements in information technology and data acquisition have created both new research opportunities and new challenges for using big data in ornithology. We provide an overview of the past, present, and future of big data in ornithology, and explore the rewards and risks associated with their application. Structured data resources (e.g., North American Breeding Bird Survey) continue to play an important role in advancing our understanding of bird population ecology, and the recent advent of semistructured (e.g., eBird) and unstructured (e.g., weather surveillance radar) big data resources has promoted the development of new empirical perspectives that are generating novel insights. For example, big data have been used to study and model bird diversity and distributions across space and time, explore the patterns and determinants of broad-scale migration strategies, and examine the dynamics and mechanisms associated with geographic and phenological responses to global change. The application of big data also holds a number of challenges wherein high data volume and dimensionality can result in noise accumulation, spurious correlations, and incidental endogeneity. In total, big data resources continue to add empirical breadth and detail to ornithology, often at very broad spatial extents, but how the challenges underlying this approach can best be mitigated to maximize inferential quality and rigor needs to be carefully considered.*

[\[PDF\] UK Environmental Observation Framework Data Advisory Group Advice Note 5: Big Data and Data from Sensors](#)

J Tedds, M Brown, P Kershaw, D Lethem, B Wright - 2017

*Classified as being one of the 'eight great technologies', big data is a rapidly evolving set of concepts and approaches which includes data discovery, collection, (re)combination, mining, analytics and preservation and may be applied to very large, dynamic and complex datasets. The UKEOF Data Advisory Group highlighted that a number of partners are working in this area and that there would be a benefit to bringing their knowledge together. Though aimed at the members of the UKEOF partnership, the paper illustrates in the context of both the providers, users of data and services*

through relevant use cases, particular technology issues and challenges, which are applicable to the wider environmental science community.

[\[PDF\] Crowd-Powered Data Mining](#)

C Chai, J Fan, G Li, J Wang, Y Zheng - arXiv preprint arXiv:1806.04968, 2018

*Many data mining tasks cannot be completely addressed by automated processes, such as sentiment analysis and image classification. Crowdsourcing is an effective way to harness the human cognitive ability to process these machine-hard tasks. Thanks to public crowdsourcing platforms, e.g., Amazon Mechanical Turk and CrowdFlower, we can easily involve hundreds of thousands of ordinary workers (i.e., the crowd) to address these machine-hard tasks. In this tutorial, we will survey and synthesize a wide spectrum of existing studies on crowd-powered data mining. We first give an overview of crowdsourcing, and then summarize the fundamental techniques, including quality control, cost control, and latency control, which must be considered in crowdsourced data mining. Next we review crowd-powered data mining operations, including classification, clustering, pattern mining, machine learning using the crowd (including deep learning, transfer learning and semi-supervised learning) and knowledge discovery. Finally, we provide the emerging challenges in crowdsourced data mining.*

[\[PDF\] Moving Beyond Consent for Citizen Science in Big Data Health and Medical Research](#)

ASY Cheung - Northwestern Journal of Technology and Intellectual ..., 2018

*Consent has been the cornerstone of the personal data privacy regime. This notion is premised on the liberal tenets of individual autonomy, freedom of choice, and rationality. The above concern is particularly pertinent to citizen science in health and medical research, in which the nature of research is often data intensive with serious implications for individual privacy and other interests. Although there is no standard definition for citizen science, it includes generally the gathering and volunteering of data by non-professionals, the participation of non-experts in analysis and scientific experimentation, and public input into research and projects. Consent from citizen scientists determines the responsibility and accountability of data users. Yet with the advancement of data mining and big data technologies, risks and harm of subsequent data use may not be known at the time of data collection. Progress of research often extends beyond the existing data. In other words, consent becomes problematic in citizen science in the big data era. The notion that one can fully specify the terms of participation through notice and consent has become a fallacy. Is consent still valid?*

[Developing Absorptive Capacity for Midstream Science in Open Innovation Contexts](#)

U Daellenbach, S Davenport, K Ruckstuhl - International Journal of Technology ..., 2017

*Open innovation and absorptive capacity research address similar issues related to the transfer of knowledge in settings where a broader perspective can yield benefits through collaboration between organisations and individuals. Both, however, have traditionally emphasised a 'firm' and 'commercial' focus. Here, we argue that these literatures can be fruitfully combined, particularly when considering the relatively under-researched partnering of public-sector researchers within mid-stream science research collaborations with commercial firms in a cross-cultural context.*

[\[HTML\] Biased Assumptions and Oversimplifications in Evaluations of Citizen Science Data Quality](#)

H Specht, E Lewandowski - The Bulletin of the Ecological Society of America, 2018

*According to the previous literature, recently published article, lesser than two-third of citizen science data quality analyses "show accuracy levels that meet our minimum thresholds for accuracy in scientific research." The authors came to this conclusion by reviewing the results of studies that compare citizen science data to reference data from professional scientists. These studies resulted in correlation or concordance statistics, or P-values from tests for significant differences between the two groups. We argue that the aggregation of citizen science quality assurance assessments, as performed by previous studies, is inappropriate for several reasons.*

### [Data Provenance in Citizen Science Databases](#)

N Tiufiakov, A Dahanayake, T Zudilova - ... Conference on Advances in Databases and ..., 2018

*Today, more and more scientific groups are developing citizen science applications. Citizen science is a relatively new domain of science that has already proved to be as beneficial as classical science. One of the major challenges citizen science face is the data quality assurance. It uses several techniques to verify the data quality based on expert evaluation, voting systems, etc. Data provenance is used in many scientific systems and provides reliable mechanism for tracking data history. It includes history of origin, changes, and all interactions between different parts of data. Data provenance by itself has many types such as "Why provenance", "When provenance", and "What provenance". The purpose of this work is to build a prototype of a database with built-in data provenance. Several databases systems and models such as Relational databases, No SQL databases are taken into consideration. Experiments are been conducted to test limitations of proposed prototype.*

### [Squadron: Incentivizing Quality-Aware Mission-Driven Crowd Sensing](#)

H Jin, H Guo, K Nahrstedt - 2018 21st International Conference on Information ..., 2018

*Recent years have witnessed the success of mobile crowd sensing systems, which outsource sensory data collection to the public crowd equipped with various mobile devices in a wide spectrum of civilian applications. We envision that crowd sensing could as well be very useful in a whole host of mission-driven scenarios, such as peacekeeping operations, non-combatant evacuations, and humanitarian missions. However, the power of crowd sensing could not be fully unleashed in mission-driven crowd sensing (MiCS) systems, unless workers are effectively incentivized to participate. Therefore, in this paper, taking into consideration workers' diverse quality of information (QoI), we propose Squadron, a quality-aware incentive mechanism for MiCS systems. Squadron adopts the reverse auction framework. It approximately minimizes the platform's total payment for worker recruiting in a computationally efficient manner, and recruits workers who potentially could provide high quality data. Furthermore, it also satisfies the desirable properties of truth-fulness and individual rationality.*

### [Human Expertise in the Interpretation of Remote Sensing Data: A Cognitive Task Analysis of Forest Disturbance Attribution](#)

AR White - International Journal of Applied Earth Observation and ..., 2019

*Development of automated image analysis programs continues; however, geovisual analytics suggests that it may be more beneficial to design symbiotic computer-human interpretation systems. It is imperative to understand the experiences, knowledge, and cognitive processes that image interpreters rely on. Cognitive Task Analysis (CTA) is a methodological framework developed from Cognitive Systems Engineering (CSE) where expert users are studied with the goals of explicating their needs, wants, and cognitive abilities for dealing with complex technological systems. Here we report the results of a CTA process carried out with users of a geovisual analytic tool to support forest disturbance detection and signification. These results suggest that different facets of the cognitive processes undertaken by users are not always explicit, and differences in the participant's attentiveness to their mental processes vary greatly. Despite these differences and pathways to their final interpretations, participants were able to successfully come to similar judgments as for their peers.*

### [Incentivizing Truthful Data Quality for Quality-Aware Mobile Data Crowdsourcing](#)

X Gong, N Shroff - Proceedings of the Eighteenth ACM International ..., 2018

*Mobile data crowdsourcing has found a broad range of applications (e.g., spectrum sensing, environmental monitoring) by leveraging the "wisdom" of a potentially large crowd of "workers" (i.e., mobile users). A key metric of crowdsourcing is data accuracy, which relies on the quality of the participating workers' data (e.g., the probability that the data is equal to the ground truth). However, the data quality of a worker can be its own private information (which the worker learns, e.g., based on its location) that it may have incentive to misreport, which can in turn mislead the crowdsourcing*

requester about the accuracy of the data. This issue is further complicated by the fact that the worker can also manipulate its effort made in the crowdsourcing task and the data reported to the requester, which can also mislead the requester. In this paper, we devise truthful crowdsourcing mechanisms for Quality, Effort, and Data Elicitation (QEDE), which incentivize strategic workers to truthfully report their private worker quality and data to the requester, and make truthful effort as desired by the requester.

### [An Introduction to Open Science/Open Access](#)

N Pontika - 10442/15729, 2018

Open-access (OA) literature is digital, online, free of charge, and free of most copyright and licensing restrictions. What makes it possible is the internet and the consent of the author or copyright holder. Open Access to Research Data Refers to the right to access and reuse digital research data under the terms and conditions set out in the Grant Agreement. Open Science is the movement to make scientific research, data and dissemination accessible to all levels of an inquiring society.

### [Codekōan: a Source Code Pattern Search Engine Extracting Crowd Knowledge](#)

C Schramm, Y Wang, F Bry - ... International Workshop on Crowd Sourcing in Software ..., 2018

Source code search is frequently needed and important in software development. Keyword search for source code is a widely used but a limited approach. This paper presents CodeKōan, a scalable engine for searching millions of online code examples written by the worldwide programmers' community which uses data parallel processing to achieve horizontal scalability. The search engine relies on a token-based, programming language independent algorithm and, as a proof-of-concept, indexes all code examples from Stack Overflow for two programming languages: Java and Python. This paper demonstrates the benefits of extracting crowd knowledge from Stack Overflow by analyzing well-known open source repositories such as OpenNLP and Elasticsearch.

### [Privacy-Preserving Crowd-Sourced Statistical Data Publishing with an Untrusted Server](#)

Z Wang, X Pang, Y Chen, H Shao, Q Wang, L Wu... - IEEE Transactions on ..., 2018

The continuous publication of aggregate statistics over crowd-sourced data to the public has enabled many data mining applications. Existing systems usually rely on a trusted server to aggregate the spatio-temporal crowd-sourced data and then apply differential privacy to perturb the aggregate statistics before publishing to provide privacy guarantee. However, users' privacy will be exposed once the server is hacked or cannot be trusted. In this paper, we study the problem of real-time crowd-sourced statistical data publishing with strong privacy protection under an untrusted server. We propose a novel distributed agent-based privacy-preserving framework, called DADP, that introduces a new level of multiple agents between the users and the untrusted server. Instead of directly uploading data to the untrusted server, a user can randomly select one agent and upload the check-in information to it with the anonymous connection technology.

### [\[PDF\] Citizen Data and Trust in Official Statistics](#)

E Ruppert, F Grommé, F Ustek-Spilda - 2018

Many, if not most, big data are connected to the lives of citizens: their movements, opinions, and relations. Arguably big data and citizens are inseparable: from smartphones, meters, fridges and cars to internet platforms, the data of digital technologies is the data of citizens. In addition to raising political and ethical issues of privacy, confidentiality and data protection, this calls for rethinking relations to citizens in the production of data for statistics if they are to be trusted by citizens. We outline an approach that involves co-producing data, where citizens are engaged in all stages of statistical production, from the design of a data production platform to the interpretation and analysis of data. While raising issues such as data quality and reliability, we argue co-production can potentially mitigate problems associated with the re-purposing of big data. We argue that in a time of 'alternative facts', what constitutes legitimate knowledge and expertise are major political sites of contention and struggle and require going beyond defending existing practices towards inventing new ones. In this context, we argue that the future of official statistics not only depends on inventing new

data sources and methods but also mobilising the possibilities of digital technologies to establish new relations with citizens.

[\[PDF\] Bridging Citizen Science and Open Educational Resource](#)

C Veja, J Hocker, C Schindler, S Kollmann - 2018

*The ongoing digitization of humanities' archival information has contributed to make highly valuable and highly distributed corpora available for research. Connecting this distributed knowledge and enriching it with more data following a specific research question is a big challenge in digital humanities. The project Interlinking Pictura (IP) addresses this challenge by bridging Citizen Science with Open Educational Resources (OER). In order to achieve this objective, citizens are involved in a broad range of participatory levels of research. Besides the involvement of lay researchers (retired teachers, citizen associations etc.), IP adjusts the tasks to open educational resources for distributing and for an easy integration into learning environments. The IP project is built on semantic wiki platform and involves open linked data to enrich the corpus. This offers the possibility to realize the interoperability at multiple levels using standardized vocabularies. The main goal of IP is the creation of an interlinked corpus about Bertuch's illustrated book through connecting the distributed knowledge about its creation, reception, and usage in pedagogical practices.*

[System and Method for Providing Data Science as a Service](#)

P Cotton - US Patent App. 15/435,635, 2018

*The invention relates to a computer-implemented system and method for providing data science as a service (DSaaS) using a real time data prediction contest. The method may comprise the steps of presenting a consumer interface via a network that allows a data consumer to identify a subject data source having data fields that can be predicted; and presenting a participant interface via the network that allows a participant to select a competition in which to participate and provides a web services interface enabling the participant to provide web services that can be called by the web services interface. The web services provide a prediction of the at least one data field, and the web services are permitted to utilize external data sources in generating the prediction. The prediction can then be transmitted via the network to the consumer.*

[Towards Collaborative Data Analysis with Diverse Crowds – A Design Science Approach](#)

M Feldman, C Anastasiu, A Bernstein - International Conference on Design Science ..., 2018

*The last years have witnessed an increasing shortage of data experts capable of analyzing the omnipresent data and producing meaningful insights. Furthermore, some data scientists mention data preprocessing to take up to 80% of the whole project time. This paper proposes a method for collaborative data analysis that involves a crowd without data analysis expertise. Orchestrated by an expert, the team of novices conducts data analysis through iterative refinement of results up to its successful completion. To evaluate the proposed method, we implemented a tool that supports collaborative data analysis for teams with mixed level of expertise. Our evaluation demonstrates that with proper guidance data analysis tasks, especially preprocessing, can be distributed and successfully accomplished by non-experts. Using the design science approach, iterative development also revealed some important features for the collaboration tool, such as support for dynamic development, code deliberation, and project journal. As such we pave the way for building tools that can leverage the crowd to address the shortage of data analysts.*

[\[PDF\] Crowdsourced Genealogies and Genomes](#)

A. A. Lussier, A. Keinan 2018

*Genealogies are likely the first, centuries-old "big data," with their construction as old as human civilization. Recent renewed interest led to the largest genealogical websites amassing 130 million users who generated billions of online genealogical profiles, offering ample research opportunities that would otherwise require extensive recruitment. We show the research potential of this type of crowdsourced data, studying genealogies based on processing 86 million public Geni profiles.*

[\[PDF\] Distributed Knowledge in Crowds: Crowd Performance on Hidden Profile Tasks](#)

Y Tausczik, M Boons - 2018

*Individuals today discuss information and form judgements as crowds in online communities and platforms. "Wisdom of the crowd" arguments suggest that, in theory, crowds have the capacity to bring together diverse expertise, pooling distributed knowledge and thereby solving challenging and complex problems. This paper concerns one way that crowds might fall short of this ideal. A large body of research in the social psychology of small groups concerns the shared information bias, a tendency for group members to focus on common knowledge at the expense of rarer information which only one or a few individuals might possess. We investigated whether this well-known bias for small groups also impacts larger crowds of 30 participants working on Amazon's Mechanical Turk. We found that crowds failed to adequately pool distributed facts; that they were partially biased in how they shared facts; and that individual perception of group decisions was unstable. Nonetheless, we found that aggregating individual reports from the crowd resulted in moderate performance in solving the assigned task.*

[Exploring Environmental Literacy in Community: Preferences for Data Display and Messaging of Air Quality Data](#)

LC Cicutto, M McCullough, K Crews, SH Cho - A54. INDOOR AND OUTDOOR AIR ..., 2018

*The availability of low-cost portable air quality monitors is paving the way for citizen science and personal monitoring of air quality exposures. However, for this tool and resultant data to be useful, the user must possess environmental literacy competencies: identifying environmental issues; analyzing environmental data; evaluating potential solutions; and proposing and implementing actions addressing air quality issues. Very little is known about the environmental literacy of adults related to air quality and their ability and preferences for making sense of air quality data. The purpose is to explore environmental literacy in adults related to air quality and to identify preferences for data display and health messaging to support informed decision making and action. We use methods based on the use of focus groups. They are being conducted with community citizens, health care providers, and community organizations. Participants complete a pre-focus group homework packet consisting of worksheets showing various data displays of air quality data with messaging. Focus groups are conducted using an interview guide, last 1.5 to 2 hours, and are audio-recorded. The results to date suggest that commonly used approaches for displaying air quality data and messaging for action are inadequate and confusing to permit informed decision making and application of exposure reduction strategies.*

[\[PDF\] Automatic Data Gathering System for Social Dialog](#)

G Lee, Y Lim, J Choi - 2018

*In this paper, we propose a system that automatically acquires dialogue data from multiple users through Google form. The system works through the interaction of the automation server and the Google API. The user enters a conversation on the system, and the server continuously collects the conversation by providing the collected conversations back to the other user. Currently, it is still under development, but we are going to add social factors such as the situation of the dialogue in the near future.*

[Studying the Influence of Requesters in Posted-Price Crowdsourcing](#)

M Bhattacharyya, SK Mridha - ... Conference on Data Science and Management of ..., 2018

*Crowd-powered systems have recently emerged as useful models for solving complex tasks online by combining machine intelligence with crowd intelligence. These models are mainly of two types- collaborative and competitive. Studying the behavior of the participating crowd workers and requester experiences might yield useful insights about both these models. Analyzing the behaviors of crowd workers has been in major focus for the past several years, whereas requester behaviors have rarely been studied.*

[\[HTML\] Special Issue on Extracting Crowd Intelligence from Pervasive and Social Big Data](#)

L Wang, V Gauthier, G Chen, L Moreira-Matias - 2018

*Crowd-powered systems have recently emerged as useful models for solving complex tasks online by combining machine intelligence with crowd intelligence. These models are mainly of two types- collaborative and competitive. Studying the behavior of the participating crowd workers and requester experiences might yield useful insights about both these models. Analyzing the behaviors of crowd workers has been in major focus for the past several years, whereas requester behaviors have rarely been studied.*

[Science Artisans and Open Science Hardware](#)

D Kera - Bulletin of Science, Technology & Society, 2018

*Open science hardware (OSH) are prototypes of laboratory instruments that use open source hardware to extend the purely epistemic (improving knowledge about nature) and normative (improving society) ideals of science and emphasize the importance of technology. They remind us of Zilsel's 1942 thesis about the artisanal origins of science and instrument making that bridged disciplinary and social barriers in the 16th century. The emphasis on making, tinkering, and design transcends research, reproducibility, and corroboration in science and pushes to the forefront educational, emancipatory, and aesthetic and exploratory uses. I will use two recent projects, OpenDrop electrowetting platform and Open Source Estrogen that make but also reflect OSH's playful, expressive, and performative strategies and define the present practices as "artisanal science." These hybrid and ambiguous practices bridge divides between present disciplines and skills but they also define science as an everyday activity directly connected to the private and public interests of the citizens*

[A First Approach for Handling Uncertainty in Citizen Science](#)

M Jiménez, I Triguero, R John - 2018

*Citizen Science is coming to the forefront of scientific research as a valuable method for large-scale processing of data. New technologies in fields such as astronomy or bio-sciences generate tons of data, for which a thorough expert analysis is no longer feasible. In contrast, communities of volunteers coordinated by the Internet are showing a great potential in completing such analysis in a reasonable time. However, this approach brings uncertainty and the spread of biases within the data, since amateur participants are usually non-experts on the subject and count with variable skills and expertise. This means lack of accuracy in results coming from Citizen Science projects. This work presents a novel approach to handle uncertainty in Citizen Science. We focus on leveraging this uncertainty in the data pursuing a refinement of results. We distinguish between two types of uncertainty: a first one due to the lack of consensus between amateurs, and another one quantified by amateurs themselves during the course of the project. We test our method using the Galaxy Zoo, a project which aims for the labelling of a huge dataset of galaxy images. Considering available expert classifications to validate our experiments, the proposed method is able to improve current accuracy and classify a greater number of images.*

[\[PDF\] The AgeGuess Database: an Open Online Resource on Chronological and Perceived Ages of People Aged 3-100](#)

JA Jones, UW Nash, J Vieillefont, K Christensen... - arXiv preprint arXiv ..., 2018

*In many developed countries, human life expectancy has doubled over the last 180 years from ~40 to ~80 years. Underlying this great advance is a change in how we age, yet our understanding of this change remains limited. Here we present a unique database rich with possibilities to study the human ageing process: the AgeGuess.org database on people's perceived and chronological ages. Perceived age (i.e. how old one looks to others) correlates with biological age, a measure of a person's health condition in comparison to the average of same-aged peers. Determining biological age usually involves elaborate molecular and cellular biomarkers. Using instead perceived age as a biomarker of biological age enables us to collect large amounts of data on biological age through a citizen science project, where people upload pictures of themselves and guess the ages of other people at [www.ageguess.org](http://www.ageguess.org). It furthermore allows to collect data retrospectively, because people can upload photographs of themselves when they were younger or of their parents and grandparents.*

*We detail how the data are collected, where the data can be downloaded free of charge, and the contained variables. Beyond ageing research, the data present a wealth of possibilities to study how humans guess ages and to use this knowledge for instance in advancing and testing emerging applications of artificial intelligence and deep learning algorithms.*

## **Crowd Science: Minitrack**

Представлены любопытные материалы международной конференции 2018 года по наукам о сложных системах.

### [Introduction to the Minitrack on Digital Social Media in Enterprise](#)

XN Deng, Y Li, KD Joshi - *Proceedings of the 51st Hawaii International ...*, 2018

*This minitrack presents theoretical and empirical studies addressing organizational, managerial, technical, and behavioral perspectives on digital and social media in enterprises. Issues and topics of study include new organizational work issues associated with digital and social media use, information security and the use/misuse of digital and social media at workplace, and effects of and support for digital and social media in enterprise. This research lies at the intersectionality of multiple disciplines, namely Information Systems, Science & Technology, Organization Science, and Behavioral Science.*

### [\[PDF\] Introduction to the Minitrack on Crowd Science](#)

J Prpic, J Kietzmann - *Proceedings of the 51st Hawaii International ...*, 2018

*Crowd Science 2018 is proud to welcome four impactful new works to the field this year, and in this short paper we provide a brief review of the new works in advance of their presentation at HICSS 51. We conclude this brief introduction with a look ahead to the Crowd Science 2019 minitrack, while illustrating numerous useful subjects for future research.*

### [Introduction to the Minitrack on Collective Intelligence and Crowds](#)

J Nickerson, P Fichman, D Steiny - *Proceedings of the 51st Hawaii International ...*, 2018

*The papers in this year's minitrack span many aspects of digital and social media, including personal conversations, online reviews, news, maps, and videos of political debate. One common theme is interaction: all papers look at how individuals interacting with media – and indirectly with each other through media – gain insight that emerges from collective effort. These efforts are timely: the past year has been marked by discussion of how social media algorithms can be manipulated to affect decision making. The antidote to this may be tools that allow consumers of media to take back control of algorithms that determine the data – and the commentary on data – they see. The papers in this minitrack offer glimpses of how this might occur.*

## **Gamification**

Модным термином сегодня является «геймификация» (от английского *gamification*, что можно несколько неуклюже перевести как «вовлечение добровольцев через игровые компоненты задач проекта»). При редактировании и сокращении аннотаций, по возможности, оставлены новые аббревиатуры и их определения. Аббревиатуры, видимо обозначают новые «точки роста» в этом быстро развивающемся направлении.

### [Is virtual citizen science a game](#)

E Simperl, N Reeves, CJ Phethean, T Lynes, R Tinati - *ACM Transactions on Social ...*, 2018

*The use of game elements within virtual citizen science is increasingly common, promising to bring increased user activity, motivation and engagement to large-scale scientific projects. However there is an ongoing debate about whether or not gamifying systems such as these is actually an effective means by which to increase motivation and engagement in the long term. While gamification itself is receiving a large amount of attention, there has been little beyond individual studies to assess its suitability or success for citizen science; similarly, while frameworks exist for assessing citizen science*

performance, they tend to lack any appreciation of the effects that game elements might have had. We therefore review the literature to determine what the trends are regarding the performance of particular game elements or characteristics in citizen science, and survey existing projects to assess how popular different game features are. Investigating this phenomenon further, we then present the results of a series of interviews carried out with the EyeWire citizen science project team to understand more about how gamification elements are introduced, monitored and assessed in a live project. Our findings suggest that projects use a range of game elements with points and leaderboards the most popular, particularly in projects that describe themselves as 'games'. Currently, gamification appears to be effective in citizen science for maintaining engagement with existing communities, but shows limited impact for attracting new players.

### [QUOIN: Incentive Mechanisms for Crowd Sensing Networks](#)

K Ota, M Dong, J Gui, A Liu - IEEE Network, 2018

Crowd sensing networks play a critical role in big data generation where a large number of mobile devices collect various kinds of data with large-volume features. Although which information should be collected is essential for the success of crowd-sensing applications, few research efforts have been made so far. On the other hand, an efficient incentive mechanism is required to encourage all crowd-sensing participants, including data collectors, service providers, and service consumers, to join the networks. In this article, we propose a new incentive mechanism called QUOIN, which simultaneously ensures Quality and Usability Of INformation for crowd-sensing application requirements. We apply a Stackelberg game model to the proposed mechanism to guarantee each participant achieves a satisfactory level of profits. Performance of QUOIN is evaluated with a case study, and experimental results demonstrate that it is efficient and effective in collecting valuable information for crowd-sensing applications.

### [\[PDF\] Repurposing Citizen Science Games as Software Tools for Professional Scientists](#)

S Cooper, ALR Sterling, R Kleffner, WM Silversmith... - 2018

Scientific software is often developed with professional scientists in mind, resulting in complex tools with a steep learning curve. Citizen science games, however, are designed for citizen scientists — members of the general public. These games maintain scientific accuracy while placing design goals such as usability and enjoyment at the forefront. In this paper, we identify an emerging use of game-based technology, in the repurposing of citizen science games to be software tools for professional scientists in their work. We discuss our experience in two such repurposings: Foldit, a protein folding and design game, and Eyewire, a web-based 3D neuron reconstruction game. Based on this experience, we provide evidence that the software artifacts produced for citizen science can be useful for professional scientists, and provide an overview of key design principles we found to be useful in the process of repurposing.

### [\[PDF\] Adopt a Polyhedron--A Citizen Art Project in Mathematics](#)

AM Hartkopf, GM Ziegler - Bridges 2018 Conference Proceedings, 2018

In our science communication project Adopt a Polyhedron we aim to involve a general audience to consecutively realize all combinatorial types of convex polyhedra in a collaborative effort. The participants adopt a polyhedron, give it a name and make a model of it. Thus, one by one the abstract geometrical description of all polyhedra becomes concrete. Similar to the concept of Citizen Science we call this collaborative process Citizen Art. In the workshop each participant receives their own unique polyhedron in the form of a number and a paper template. It can be formally adopted on our website. Then the participants make an individual model of the polyhedron from a material of their choice. We bring a variety of materials. The finished models will be exhibited in the venue and pictures can be uploaded to the website in order to prove that another polyhedron has found its way into being realized. The website is available under [poly.mathematik.de](http://poly.mathematik.de).

### [\[PDF\] Learning from Crowdsourced Virtual Reality Demonstrations](#)

D Whitney, E Rosen, S Tellex - 2018

Learning from demonstration (LfD) has been a widely popular methodology for teaching robots how to perform manipulation tasks because it leverages human knowledge. However, collecting high quality

demonstrations that can be used for learning robot policies can be time-consuming and difficult. Recently, some researchers have begun using consumer-grade virtual reality (VR) hardware as a more efficient means of teleoperating a robot for collecting demonstrations. Previous work in this space has focused on tasks and algorithms that require relatively little data due to the time-sink of demonstration generation. We propose a novel crowdsourcing framework that takes advantage of the large virtual reality gaming community. By treating these experienced VR users as citizen scientists, we will empower our robot with the demonstration data needed to complete complex manipulation tasks.

[Developing Education Research Competencies in Mathematics Teachers Through TRAIL: Teacher-Researcher Alliance for Investigating Learning](#)

B Koichu, A Pinto - *Canadian Journal of Science, Mathematics and ...*, 2018

*This theoretical article explores an issue of developing education research competencies in mathematics teachers through their involvement in mathematics education research. We first argue that the development of education research competencies is beneficial for the teachers' professional growth. We then identify opportunities for mathematics teachers to develop education research competencies through different modes of research-practice partnerships. In the main part of the paper, we present a particular theoretical-organizational framework for large-scope teacher-researcher collaborations in educational research. The framework is called Teacher-Researcher Alliance for Investigating Learning (TRAIL), and consists of a set of theoretically laden premises, design heuristics, and provisional partnerships.*

["A game without competition is hardly a game": The impact of competitions on player activity in a human computation game](#)

N Reeves, P West, E Simperl - 2018

*Virtual citizen science (VCS) projects enable new forms of scientific research using crowdsourcing and human computation to gather and analyse large-scale datasets. To attract and sustain the number of participants and levels of participation necessary to achieve research aims, some VCS projects have introduced game elements such as competitions to tasks. However, we still know very little about how some game elements, particularly competitions, influence participation rates. To investigate the impact of game elements on player engagement, we conducted a two-part mixed-methods study of EyeWire, a VCS game. First, we interviewed EyeWire designers to understand their rationale for introducing competitions. Guided by their answers, we analysed two datasets of EyeWire user task contributions and chat logs to assess the effectiveness of competitions in achieving designers' goals. Our findings contribute to the growing understanding of how competitions influence participant activity in human computation initiatives and socio-technical systems such as VCS.*

[A Collaborative Citizen Science Platform for Real-Time Volunteer Computing and Games](#)

P Yadav, I Charalampidis, J Cohen, J Darlington... - *IEEE Transactions on ...*, 2018

*Volunteer computing (VC) or distributed computing projects are common in the citizen cyberscience (CCS) community and present extensive opportunities for scientists to make use of computing power donated by volunteers to undertake large-scale scientific computing tasks. VC is generally a noninteractive process for those contributing computing resources to a project, whereas volunteer thinking (VT) or distributed thinking allows volunteers to participate interactively in CCS projects to solve human computation tasks. In this paper, we describe the integration of three tools, the Virtual Atom Smasher (VAS) game developed by CERN, LiveQ, a job distribution middleware, and CitizenGrid, an online platform for hosting and providing computation to CCS projects. This integration demonstrates the combining of VC and VT to help address the scientific and educational goals of games like VAS. This paper introduces the three tools and provides details of the integration process along with further potential usage scenarios for the resulting platform.*

## [A Survey of Incentive Engineering for Crowdsourcing](#)

C Muldoon, MJ O'Grady, GMP O'Hare - *The Knowledge Engineering Review*, 2018

*With the growth of the Internet, crowdsourcing has become a popular way to perform intelligence tasks that hitherto would be either performed internally within an organization or not undertaken due to prohibitive costs and the lack of an appropriate communications infrastructure. In crowdsourcing systems, whereby multiple agents are not under the direct control of a system designer, it cannot be assumed that agents will act in a manner that is consistent with the objectives of the system designer or principal agent. In situations whereby agents' goals are to maximize their return in crowdsourcing systems that offer financial or other rewards, strategies will be adopted by agents to game the system if appropriate mitigating measures are not put in place. The motivational and incentivization research space is quite large; it incorporates diverse techniques from a variety of different disciplines including behavioural economics, incentive theory, and game theory. This paper specifically focusses on game theoretic approaches to the problem in the crowdsourcing domain and places it in the context of the wider research landscape. It provides a survey of incentive engineering techniques that enable the creation of apt incentive structures in a range of different scenarios.*

## [Deep Learning is Combined with Massive-Scale Citizen Science to Improve Large-Scale Image Classification](#)

DP Sullivan, CF Winsnes, L Åkesson, M Hjelmare... - *Nature Biotechnology*, 2018

*Pattern recognition and classification of images are key challenges throughout the life sciences. We combined two approaches for large-scale classification of fluorescence microscopy images. First, using the publicly available data set from the Cell Atlas of the Human Protein Atlas (HPA), we integrated an image-classification task into a mainstream video game (EVE Online) as a mini-game, named Project Discovery. Participation by 322,006 gamers over 1 year provided nearly 33 million classifications of subcellular localization patterns, including patterns that were not previously annotated by the HPA. Second, we used deep learning to build an automated Localization Cellular Annotation Tool (Loc-CAT). This tool classifies proteins into 29 subcellular localization patterns and can deal efficiently with multi-localization proteins, performing robustly across different cell types. We found that engaging players of commercial computer games provided data that augmented deep learning and enabled scalable and readily improved image classification.*

## **Кооперативное зондирование**

Развитие Интернета и мобильных технологий существенно повышает потенциал распределенных проектов. Проекты, в которых решающую роль играют онлайн-технологии, так и называют: «кибернаука граждан». Кибернаука граждан делится на три категории: добровольческие вычисления, добровольческое осмысливание и кооперативное зондирование.

Принята классификация, согласно которой т.н. «кибернаука граждан» распадается на три категории: добровольческие вычисления, добровольческое осмысливание и кооперативное зондирование. Термин «кооперативное зондирование» был предложен как разумный вариант перевода термина “*crowd sensing*”. Кооперативное зондирование тех или иных параметров (как правило, имеющих отношение к окружающей среде) начинается с того, что участники проекта скачивают на свой смартфон приложение, которое позволяет им собирать данные. При этом используются датчики, которые уже в смартфоне имеются. Это различные трансиверы (мобильная сеть, WiFi, Bluetooth), приемники FM и GPS, камеры, акселерометр, цифровой компас и микрофон. Кооперативное зондирование состоит в сборе, обработке и передаче данных добровольцами. Этот вид проектов является типичной «наукой толпы». Во всяком случае, нет каких-либо сведений о наличии организаций типа «Союза любителей кооперативного зондирования», что, наоборот, характерно для науки граждан. При этом кооперативное зондирование является наиболее быстроразвивающимся видом распределенных проектов. Разработка соответствующих приложений для смартфонов превратилась в целую индустрию. Массивы данных, поступающих от добровольцев,

используются как отдельно, так и в сочетании с массивами, поступающими с традиционных устройств, например, от сети метеорологических станций.

[\[PDF\] An Incentive Mechanism for Crowd Sensing with Colluding Agents](#)

S Xu, W Mao, Y Cao, HY Noh, NB Shah - arXiv preprint arXiv:1809.05161, 2018

*Vehicular mobile crowd sensing is a fast-emerging paradigm to collect data about the environment by mounting sensors on vehicles such as taxis. An important problem in vehicular crowd sensing is to design payment mechanisms to incentivize drivers (agents) to collect data, with the overall goal of obtaining the maximum amount of data (across multiple vehicles) for a given budget. Past works on this problem consider a setting where each agent operates in isolation — an assumption which is frequently violated in practice. In this paper, we design an incentive mechanism to incentivize agents who can engage in arbitrary collusions. Experiments based on synthesized data and real-world data reveal gains of over 30% attained by the mechanism proposed compared to past literature.*

[Detecting Label Errors in Crowd-Sourced Smartphone Sensor Data](#)

X Bo, C Poellabauer, MK O'Brien, CK Mummidisetty... - Social Sensing (SocialSens) ..., 2018

*Applications relying on supervised learning algorithms are susceptible to producing false outputs in the presence of label errors, i.e., situations where labels have been corrupted, both deliberately and accidentally. While prior work has focused on detecting and handling label errors for various types of applications, there is a lack of research addressing label errors in smartphone-based crowd-sensing applications, especially when used for action recognition. In this paper, we discuss and address two common types of smartphone-based label errors: mislabeling and multi-action labels. We also compare multiple learning algorithms, including an ensemble of four stratified trained classifiers. The results indicate the importance of the action type for filtering label error. The goal of this work is to provide guidelines for developing effective techniques to discover and remove error labels for action recognition systems.*

[Thanos: Incentive Mechanism with Quality Awareness for Mobile Crowd Sensing](#)

H Jin, L Su, D Chen, H Guo, K Nahrstedt, J Xu - IEEE Transactions on Mobile ..., 2018

*Recent years have witnessed the emergence of mobile crowd sensing (MCS) systems, which leverage the public crowd equipped with various mobile devices for large scale sensing tasks. In this paper, we study a critical problem in MCS systems, namely, incentivizing worker participation. Different from existing work, we propose an incentive framework for MCS systems, named Thanos, that incorporates a crucial metric, called workers' quality of information (QoI). Due to various factors (e.g., sensor quality, environment noise), the quality of the sensory data contributed by individual workers varies significantly. Obtaining high quality data with little expense is always the ideal of MCS platforms. Technically, our design of Thanos is based on reverse combinatorial auctions.*

[\[PDF\] Distributed crowd-based annotation of soccer games using mobile devices](#)

B Barros, C Serrão, R Lopes - Distributed crowd-based annotation of soccer games ..., 2018

*Soccer is one of the most loved sports in the world. Millions of people either follow the sport or are actually involved in its practice. Soccer also moves huge financial amounts every year and therefore teams always thrive to be better than the competition. New technologies have become a common place both in the preparation of the games and on the analysis of the games after they are concluded. In this paper, the authors will present a developed system, based on the usage of distributed mobile devices, that will enable the annotation of soccer matches, either in real time or after the match is concluded (through the observation of other media). The capture of relevant events in the game can be used to better analyse the game and the performance of individual players fostering improvements and better decisions in the future. The application is implemented in the Android platform so that it can be easily installed by typical soccer fans empowering them as match annotators. This crowd of annotators, although not experts, can collectively provide a robust and rich annotation for soccer matches.*

### [Crowdsensing-Based Road Condition Monitoring Service: An Assessment of Its Managerial Implications to Road Authorities](#)

K Laubis, F Knöll, V Zeidler, V Simko - ... Conference on Exploring Service Science, 2018

*The ubiquity of smart devices in vehicles, such as smartphones allows for a crowdsensing-based information gathering of the vehicle's environment. For example, accelerometers can reveal insights into road condition. From a road authorities' perspective, knowing the road condition is essential for scheduling maintenance actions in an efficient and sustainable manner. In Germany, expensive laser-based road inspections are scheduled every four years. In future, they could be extended or completely replaced with a crowd-based monitoring service. This paper determines whether the lower accuracy of crowdsensing-based measurements is redeemed by its potential of near-real time data updates. Partially observable Markov decision processes are applied for determining maintenance policies that minimize roads' life-cycle costs.*

### [Truthful Incentive Mechanisms for Mobile Crowd Sensing with Dynamic Smartphones](#)

H Cai, Y Zhu, Z Feng, H Zhu, J Yu, J Cao - Computer Networks, 2018

*The emergence of ubiquitous mobile devices has given rise to mobile crowd sensing, as a new data collection paradigm to potentially produce enormous economic value. Fully aware of the paramount importance to incentivize smartphone users' participation, a wide variety of incentive mechanisms have been proposed, however, most of which have made the impractical assumption that smartphones remain static in the system and sensing tasks are known in advance. Designing truthful incentive mechanisms for mobile crowd sensing system has to address four major challenges, i.e., dynamic smartphones, uncertain arrivals of tasks, strategic behaviors, and private information of smartphones. To jointly address these four challenges, we propose two truthful auction mechanisms, OT-OFMCS and NOT-ONMCS, with respect to the offline and online case of mobile crowd sensing, aiming at selecting an optimal set of winning bids with low costs for maximizing the social welfare.*

### [An Adaptive Energy Efficient Flow Coverage Scheme for Mobile Crowd Sensing In Urban Streets](#)

AAA Gad-EIRab, AS Alsharkawy - International Journal of Ad Hoc and Ubiquitous ..., 2018

*With the rapid growth of sensor technology, smartphone sensing has become an effective approach to improve the quality of applications in smartphones. Mobile crowd sensing (MCS) is a new paradigm which takes advantage of pervasive smartphones to efficiently collect data in the urban streets. To achieve a good service quality for a MCS application, coverage mechanisms are necessary to achieve the sensing task requirements. The main problem is how to cover all segments in the street sides and select a minimal number of participants in each street segment. To solve this problem, a flow coverage scheme is proposed to cover a specific street. The proposed scheme is based on using a modified localisation method that uses a minimal of GPS sensors and utilises the Zigbee technology to communicate and estimate the distance between nodes. Extensive simulation results well justify the effectiveness and robustness of the proposed scheme.*

### [Developing Mobile Applications for Environmental and Biodiversity Citizen Science: Considerations and Recommendations](#)

S Luna, M Gold, A Albert, L Ceccaroni, B Claramunt... - Multimedia Tools and ..., 2018

*The functionality available on modern 'smartphone' mobile devices, along with mobile application software and access to the mobile web, have opened up a wide range of ways for volunteers to participate in environmental and biodiversity research by contributing wildlife and environmental observations, geospatial information, and other context-specific and time-bound data. This has brought about an increasing number of mobile phone based citizen science projects that are designed to access these device features (such as the camera, the microphone, and GPS location data), as well as to reach different user groups, over different project durations, and with different aims and goals. In this chapter we outline a number of key considerations when designing and developing mobile applications for citizen science, with regard to (1) Interoperability. The factors that influence the usability of the mobile application are covered in both (2) Participant Centred Design*

and Agile Development, and (3) User Interface and Experience Design. Finally, the factors that influence sustained engagement in the project are covered in (4) Motivational Factors for Participation.

[\[PDF\] Maximizing spatial-temporal coverage in mobile crowd-sensing based on public transports with predictable trajectory](#)

C Wang, C Li, C Qin, W Wang, X Li - International Journal of Distributed Sensor ..., 2018

*Mobile crowd-sensing is a prospective paradigm especially for intelligent mobile terminals, which collects ubiquitous data efficiently in metropolis. The existing crowd-sensing schemes based on intelligent terminals mainly consider the current trajectory of the participants, and the quality highly depends on the spatial-temporal coverage which is easily weakened by the mobility of participants. Nowadays, public transports are widely used and affordable in many cities around the globe. Public transports embedded with substantial sensors act as participants in crowd-sensing, but different from the intelligent terminals, the trajectory of public transports is schedulable and predictable, which sheds an opportunity to achieve high-quality crowd-sensing. Therefore, based on the predictable trajectory of public transports, we design a novel system model and formulate the selection of public transports as an optimization problem to maximize the spatial-temporal coverage. The results show that our algorithm achieves a near optimal coverage and outperforms existing algorithms.*

[Contract Theory Based Incentive Scheme for Mobile Crowd Sensing Networks](#)

M Dai, Z Su, Y Wang, Q Xu - 2018 International Conference on Selected Topics in ..., 2018

*Mobile crowd sensing networks (MCSNs) have emerged as a promising paradigm to provide various sensing services. With the increasing number of mobile users, how to develop an effective scheme to provide the high-quality and secure sensing data becomes a new challenge. In this paper, we propose a contract theory based scheme to provide sensing service in MCSNs. At first, with the analysis of the interaction experience between the crowd sensing platform and mobile user, a trust scheme is introduced to guarantee the quality of sensing data by considering the direct trust and indirect trust. Next, according to the transaction between crowd sensing platform and mobile user, an optimal contract based on incentive scheme is designed to stimulate mobile users to participate in crowd sensing network, where the contract item can not only maximize the platform utility, but also satisfy individual rationality and incentive compatibility. Finally, the numerical results show that the proposal outperforms the conventional schemes.*

[Mobile Crowd Sensing in Traffic Monitoring](#)

C Nandagopal, SM Ramesh - Indian Journal of Science and Technology, 2018

*A technology is proposed to sense the environment without using the dedicated architecture for sensing. Mobile crowd sensing is a new emerging technology in the field of wireless sensor network environment monitoring. Wireless sensor network monitoring enters a new paradigm with mobile crowd sensing. The technology makes the user to participate in the event and user's mobile device is used to communicate the data in different environment. The sensing network uses the mobiles of user to collect the data. In our application discussed here we are monitoring the traffic in public transport system. We use the public's opinion to collect data by an application in their mobiles. Through we are able to know the traffic in road, crowd in the buses, and quality of buses. Findings: We also compared this with normal wireless sensor networks used for monitoring the transport in the roads on comparison we find the MCS provides better sensing than normal wireless sensor networks in the case energy management, memory management and performance improvement. The technology can be improved or established in train transport and other public place cleanliness monitoring.*

[Incentive Mechanisms for Mobile Crowd Sensing Based on Supply-Demand Relationship](#)

J Xu, W Lu, L Xu, D Yang, T Li - Peer-to-Peer Networking and Applications, 2018

*Mobile crowd sensing has become an efficient paradigm for performing large scale sensing tasks. An incentive mechanism is important for the mobile crowd sensing system to stimulate participants, and to achieve good service quality. In this paper, we design the incentive mechanisms for mobile crowd*

sensing, where the price and supply of the resource contributed by the smartphone users are determined by the supply-demand relationship of market. We present two models of mobile crowd sensing: the resource model and the budget model. In the resource model, each sensing task has the least resource demand. In the budget model, each task has a budget constraint. We design an incentive mechanism for each of the two models. Through both rigorous theoretical analysis and extensive simulations, we demonstrate that the proposed incentive mechanisms achieve computational efficiency, profitability, individual rationality, and truthfulness. Moreover, the designed mechanisms can satisfy the properties of non-monopoly and constant discount under certain conditions.

[Crowdsourcing as an Analytical Method: Metrology of Smartphone Measurements in Heritage Science.](#)

R Bringham, J Grau-Bove, A Rudnicka, M Cassar... - *Angewandte Chemie*, 2018

*This research assesses the precision, repeatability, and accuracy of crowdsourced scientific measurements, and whether their quality is sufficient to provide usable results. Measurements of colour and area were chosen because of the possibility of producing them with smartphone cameras. The quality of the measurements was estimated experimentally by comparing data contributed by anonymous participants in heritage sites with reference measurements of known accuracy and precision. Participants performed the measurements by taking photographs with their smartphones, from which colour and dimensional data could be extracted. The results indicate that smartphone measurements provided by citizen scientists can be used to measure changes in colour, but that the performance is strongly dependent on the measured colour coordinate. The same method can be used to measure areas when the difference in colour with the neighbouring areas is large enough. These results render the method useful in some heritage science contexts, but higher precision would be desirable.*

[Location Privacy-Preserving Method for Auction-Based Incentive Mechanisms in Mobile Crowd Sensing](#)

T Liu, Y Zhu, T Wen, J Yu - *The Computer Journal*, 2017

*It is of significant importance to provide incentives to smartphone users in mobile crowd sensing systems. Recently, a number of auction-based incentive mechanisms have been proposed. However, an auction-based incentive mechanism may unexpectedly release the location privacy of smartphone users, which may seriously reduce the willingness of users participating in contributing sensing data. In an auction-based incentive mechanism, even if the location of a user is not enclosed in his/her bid submitted to the platform, the location information may still be inferred by an adversary by using the prices of the tasks required by the user. We take an example to show how an attack can recover the location information of a smartphone user by merely knowing his/her bid. To defend against such an attack, we propose a method to protect location privacy in auctions for mobile crowd sensing systems. This method encrypts prices in a bid so that the adversary cannot access and hence the location privacy of users can be protected. In the meanwhile, however, the auction can proceed properly, i.e. the platform can select the user offering the lowest price for each sensing task or the platform can choose users with budget constraint. We demonstrate the effectiveness of our proposed method with theoretical analysis and simulations.*

[\[PDF\] Optimizing Wirelessly Powered Crowd Sensing: Trading Energy for Data](#)

X Li, C You, S Andreev, Y Gong, K Huang - arXiv preprint arXiv:1712.10097, 2017

*To overcome the limited coverage in traditional wireless sensor networks, mobile crowd sensing (MCS) has emerged as a new sensing paradigm. To achieve longer battery lives of user devices and incentive human involvement, this paper presents a novel approach that seamlessly integrates MCS with wireless power transfer, called wirelessly powered crowd sensing (WPCS), for supporting crowd sensing with energy consumption and offering rewards as incentives. The optimization problem is formulated to simultaneously maximize the data utility and minimize the energy consumption for service operator, by jointly controlling wireless-power allocation at the access point (AP) as well as sensing-data size, compression ratio, and sensor-transmission duration at mobile sensor (MS). Given the fixed compression ratios, the optimal power allocation policy is shown to have a threshold-based*

structure with respect to a defined crowd-sensing priority function for each MS. Given fixed sensing-data utilities, the compression policy achieves the optimal compression ratio. Extensive simulations are also presented to verify the efficiency of the contributed mechanisms.

### [Blow Flies as Urban Wildlife Sensors](#)

C Hoffmann, K Merkel, A Sachse, P Rodríguez... - *Molecular Ecology* ..., 2018

*Wildlife detection in urban areas is very challenging. Conventional monitoring techniques such as direct observation are faced with the limitation that urban wildlife is extremely elusive. It was recently shown that invertebrate derived DNA (iDNA) can be used to assess wildlife diversity in tropical rainforests. Flies, which are ubiquitous and very abundant in most cities, may also be used to detect wildlife in urban areas. In urban ecosystems, however, overwhelming quantities of domestic mammal DNA could completely mask the presence of wild mammal DNA. To test whether urban wild mammals can be detected using fly iDNA, we performed DNA metabarcoding of pools of flies captured in Berlin, Germany, using three combinations of blocking primers. Our results show that domestic animal sequences are, as expected, very dominant in urban environments. Nevertheless, wild mammal sequences can often be retrieved, although they usually only represent a minor fraction of the sequence reads. Fly iDNA metabarcoding is therefore a viable approach for quick scans of urban wildlife diversity. Interestingly, our study also shows that blocking primers can interact with each other in ways that affect the outcome of metabarcoding. We conclude that the use of complex combinations of blocking primers, although potentially powerful, should be carefully planned when designing experiments.*

### [Risk and Resilience in an Uncertain World](#)

VH Dale, HI Jager, AK Wolfe, RA Efronymson - *Frontiers in Ecology and the* ..., 2018

*The ecologists are using new tools for detecting environmental change at different temporal, spatial, and organizational scales. For instance, the development of smartphones has led to an explosion of information sharing via apps and citizen-science initiatives .*

### [Crowdsourcing as an Analytical Method: Metrology of Smartphone Measurements in Heritage Science.](#)

R Bringham, J Grau-Bove, A Rudnicka, M Cassar... - *Angewandte Chemie*, 2018

*This research assesses the precision, repeatability, and accuracy of crowdsourced scientific measurements, and whether their quality is sufficient to provide usable results. Measurements of colour and area were chosen because of the possibility of producing them with smartphone cameras. The quality of the measurements was estimated experimentally by comparing data contributed by anonymous participants in heritage sites with reference measurements of known accuracy and precision. Participants performed the measurements by taking photographs with their smartphones, from which colour and dimensional data could be extracted. The results indicate that smartphone measurements provided by citizen scientists can be used to measure changes in colour, but that the performance is strongly dependent on the measured colour coordinate. The same method can be used to measure areas when the difference in colour with the neighbouring areas is large enough. These results render the method useful in some heritage science contexts, but higher precision would be desirable.*

### [\[PDF\] Maximizing Spatial–Temporal Coverage in Mobile Crowd-Sensing Based on Public Transports with Predictable Trajectory](#)

C Wang, C Li, C Qin, W Wang, X Li - *International Journal of Distributed Sensor* ..., 2018

*Mobile crowd-sensing is a prospective paradigm especially for intelligent mobile terminals, which collects ubiquitous data efficiently in metropolis. The existing crowd-sensing schemes based on intelligent terminals mainly consider the current trajectory of the participants, and the quality highly depends on the spatial-temporal coverage which is easily weakened by the mobility of participants. Nowadays, public transports are widely used and affordable in many cities around the globe. Public transports embedded with substantial sensors act as participants in crowd-sensing, but different from the intelligent terminals, the trajectory of public transports is schedulable and predictable, which*

*sheds an opportunity to achieve high-quality crowd-sensing. Therefore, based on the predictable trajectory of public transports, we design a novel system model and formulate the selection of public transports as an optimization problem to maximize the spatial–temporal coverage. After proving the public transport selection is non-deterministic polynomial-time hardness, an approximation algorithm is proposed and the coverage is close to 1. We evaluate the proposed algorithm with samples of real T-Drive trajectory data set. The results show that our algorithm achieves a near optimal coverage and outperforms existing algorithms.*

[HTML] [Mobile Augmented Reality for Flood Visualisation](#)

P Haynes, S Hehl-Lange, E Lange - *Environmental Modelling & Software*, 2018

*Mobile Augmented Reality (MAR) for environmental planning and design has hardly been touched upon, yet mobile smart devices are now capable of complex, interactive, and immersive real time visualisations. We present a real time immersive prototype MAR app for on site content authoring and flood visualisation combining available technologies to reduce implementation complexity. Networked access to live sensor readings provides rich real time annotations. Our main goal was to develop a novel MAR app to complement existing flood risk management (FRM) tools and to understand how it is judged by water experts. We present app development in context of the literature and conduct a small user study. Going beyond the presented work, the flexibility of the app permits a broad range of applications in planning, design and environmental management.*

[Developing Mobile Applications for Environmental and Biodiversity Citizen Science: Considerations and Recommendations](#)

S Luna, M Gold, A Albert, L Ceccaroni, B Claramunt... - *Multimedia Tools and ...*, 2018

*The functionality available on modern ‘smartphone’ mobile devices, along with mobile application software and access to the mobile web, have opened up a wide range of ways for volunteers to participate in environmental and biodiversity research by contributing wildlife and environmental observations, geospatial information, and other context-specific and time-bound data. This has brought about an increasing number of mobile phone based citizen science projects that are designed to access these device features (such as the camera, the microphone, and GPS location data), as well as to reach different user groups, over different project durations, and with different aims and goals. In this chapter we outline a number of key considerations when designing and developing mobile applications for citizen science, with regard to (1) Interoperability. The factors that influence the usability of the mobile application are covered in both (2) Participant Centred Design and Agile Development, and (3) User Interface and Experience Design. Finally, the factors that influence sustained engagement in the project are covered in (4) Motivational Factors for Participation.*

## **Океанология**

Суть распределенного океанологического проекта У.Уивелла, который дал старт всей современной системе распределенных коллективных исследований, состояла в том, что в течение двух недель июня 1835 г. более тысячи добровольцев по обе стороны Атлантического океана (девять стран и колоний) фиксировали параметры прилива. Добровольцы представляли различные профессии, связанные с морем: портовые рабочие, грузчики, портовые лоцманы и другие. Число наблюдений достигло миллиона. Уивелл собрал и обработал эти наблюдения, причем основная трудность состояла в синхронизации наблюдений. Например, удалось установить корреляцию между высотой приливных волн в Нью-Йорке и на побережье Британии в одно и то же время. Для Британии, всецело опиравшейся на морскую торговлю, эти данные были очень важны. Появилась новая наука о приливах (*tidology*). Сегодня океанология по-прежнему относится к числу дисциплин, в которых распределенные добровольческие проекты востребованы в наибольшей степени. Согласно публикациям последних двух лет, интересы сетевых добровольческих исследований сосредоточены, главным образом, на вопросах просвещения, мониторинге экологического состояния морей и океанов, изучении социального самочувствия морских животных и выявлении зон скопления мусора.

## [POSEIDON-Passive-acoustic Ocean Sensor for Entertainment and Interactive Data-gathering in Opportunistic Nautical-activities](#)

M Radeta, NJ Nunes, D Vasconcelos, V Nisi - Proceedings of the 2018 on Designing ..., 2018

*Recent years demonstrate an increased interest in Passive Acoustic Monitoring (PAM) applications when studying cetaceans. However, they remain expensive underwater systems and targeted for industrial and military purposes. While the usage of smartphones as acoustic sensors has been observed in terrestrial environments, ocean and nautical PAM applications remain greatly unexplored. This paper presents the design, deployment and testing of a POSEIDON system, used for real-time augmentation of whale-watching experiences. We collect and use cetaceans' vocal call acoustic samples (clicks, moans and whistles) and apply machine learning for offline model training and prediction. When discriminating the calls, we find that Extra Trees and Gradient Boosting outperform other classifiers (>0.95 confidence threshold). Collected samples are at disposal to citizen scientists and marine biologists. Future studies involve real-time on-boat user testing.*

## [Citizen Science to Engage and Empower Youth in Marine Science](#)

ML Krach, E Gottlieb, E Harris - Exemplary Practices in Marine Science Education, 2019

*Citizen science projects can empower students as science learners and practitioners by enhancing students' understanding of science content and process, exposing them to science careers, and increasing their awareness of environmental issues on local and global scales. A citizen science program invites members of the public to collaborate with professional scientists on scientific research. Citizen science offers a highly motivating project for many marine science students. Both in a formal and informal educational environment, citizen science can yield benefits to teachers and students. By examining the successful youth-based citizen science program LiMPETS (Long-term Monitoring Program and Experiential Training for Students), this chapter discusses why and how to incorporate citizen science into marine science learning.*

## [Partnering with Fishing Fleets to Monitor Ocean Conditions](#)

G Gawarkiewicz, A Malek Mercer - Annual Review of Marine Science, 2018

*Engaging ocean users, including fishing fleets, in oceanographic and ecological research is a valuable method for collecting high-quality data, improving cost efficiency, and increasing societal appreciation for scientific research. As research partners, fishing fleets provide broad access to and knowledge of the ocean, and fishers are highly motivated to use the data collected to better understand the ecosystems in which they harvest. Here, we discuss recent trends in collaborative research that have increased the capacity of and access to scientific data collection. We also describe common elements of successful collaborative research programs, including definition of a scientific problem and goals, choice of technology, data collection and sampling design, data management and dissemination, and data analysis and communication. Finally, we review four case studies that demonstrate the general principles of effective collaborative research as well as the utility of citizen-collected data for academic research and fisheries management. We also discuss the challenge of funding, particularly as it relates to maintaining collaborative research programs in the long term. We conclude with a discussion of likely future trends. Ultimately, we predict that collaborative research will continue to grow in importance as climate change increasingly impacts ocean ecosystems, commercial fisheries, and the global food supply.*

## [Using Citizen Science Data to Assess the Difference in Marine Debris Loads on Reefs in Queensland, Australia](#)

A Bauer-Civiello, J Loder, M Hamann - Marine Pollution Bulletin, 2018

*The prevalence of marine debris in [global oceans](#) is negatively impacting the marine environment. In Australia, marine debris has been an increasing concern for sensitive marine environments, such as [coral reefs](#). Citizen science can contribute data to explore patterns of [subtidal](#) marine debris loads. This study uses data from Reef Check Australia to describe patterns of debris abundance on reef tourism sites in two Queensland regions, the Great Barrier Reef (GBR) and Southeast Queensland*

(SEQ). Debris was categorized into three groups, fishing line, fishing net, and general rubbish. Overall, debris abundance across reefs was relatively low (average 0.5–3.3 items per survey (400m<sup>2</sup>)), but not absent on remote reefs surveyed in the GBR region. Highest debris loads were recorded in SEQ near cities and high use areas. These results indicate the presence of marine debris on remote and urban reefs, and the applicability of using citizen science to monitor debris abundance.

### [Citizen Science at the Shore](#)

J Nugent - Science Scope, 2018

*In 2003, the United Kingdom–based Shark Trust launched The Great Eggcase Hunt to document observations of shark, skate, and ray eggcases that washed ashore, or that were observed in seaweed beds near the shoreline. Since that time, the project expanded worldwide, and so observations of shark, skate, and ray eggcases from any geographic location can be submitted online*

### [\[PDF\] California Mussels as Bio-Indicators of Ocean Acidification](#)

B Gaylord, E Rivest, T Hill, E Sanford, P Shukla... - 2018

*Ocean acidification is a growing threat to marine life in California waters and around the world. Therefore, an important goal is to identify viable bio-indicators that will assist State managers and policymakers in tracking biological and ecological consequences of this crucial perturbation to the chemistry of seawater. Although a number of bio-indicator species have been proposed and even pursued, the ideal candidate will possess several features: sensitivity to ocean acidification, familiarity to the public, easy accessibility to monitoring efforts, and economic and/or ecological importance. The California mussel (*Mytilus californianus*) meets all of these criteria.*

### [Building and Maintaining a Citizen Science Network With Fishermen and Fishing Communities Post Deepwater Horizon Oil Disaster Using a CBPR Approach](#)

AAJ Sullivan, S Croisant, M Howarth, GT Rowe... - NEW SOLUTIONS: A ..., 2018

*When the Deepwater Horizon oil rig blew out in 2010, the immediate threats to productive deep water and estuarial fisheries and the region's fishing and energy economies were obvious. Less immediately obvious, but equally unsettling, were risks to human health posed by potential damage to the regional food web. This paper describes grassroots and regional efforts by the Gulf Coast Health Alliance: health risks related to the Macondo Spill Fishermen's Citizen Science Network project. Using a community-based participatory research approach and a citizen science structure, the multiyear project measured exposure to petrogenic polycyclic aromatic hydrocarbons, researched the toxicity of these polycyclic aromatic hydrocarbon compounds, and communicated project findings and seafood consumption guidelines throughout the region (coastal Louisiana, Mississippi, and Alabama). Description/analysis focuses primarily on the process of building a network of working fishermen and developing group environmental health literacy competencies.*

### [Shark Research: Emerging Technologies and Applications for the Field and Laboratory](#)

JC Carrier, MR Heithaus, CA Simpfendorfer - 2018

*Over the last decade, the study of shark biology has benefited from the development, refinement, and rapid expansion of novel techniques and advances in technology. These have given new insight into the fields of shark genetics, feeding, foraging, bioenergetics, imaging, age and growth, movement, migration, habitat preference, and habitat use. This pioneering book, written by experts in shark biology, examines technologies such as autonomous vehicle tracking, underwater video approaches, molecular genetics techniques, and accelerometry, among many others. Each detailed chapter offers new insights and promises for future studies of elasmobranch biology, provides an overview of appropriate uses of each technique, and can be readily extended to other aquatic fish and marine mammals and reptiles.*

## [Comparing Citizen Science Reports and Systematic Surveys of Marine Mammal Distributions and Densities](#)

GKA Harvey, TA Nelson, PC Paquet, CJ Ferster... - Biological Conservation, 2018

*Citizen science observations represent a significant and growing source of species and ecosystem knowledge. These data have potential to support traditional surveys. Databases of citizen observations of wildlife are growing, but how to use this information for scientific purposes is less clear owing to uncertainty in sampling distribution and data quality. In this study, we demonstrate how mapping cetacean patterns using citizen observations and systematic surveys generate consistent and different understandings of cetacean distributions and densities, and evaluate potential risk by assessing cumulative human effects in British Columbia, Canada. We used GIS-based map comparison methods that quantified differences and similarities between geographic datasets to locate where cetacean distributions and densities had spatially unique or spatially analogous representation. We demonstrate the use of citizen observations as a confirmatory dataset to broaden ecological exploration by augmenting scientific survey datasets and identifying strategic areas for future data collection efforts.*

## [Persistent Marine Litter: Small Plastics and Cigarette Butts Remain on Beaches After Organized Beach Cleanups](#)

XI Loizidou, MI Loizides, DL Orthodoxou - Environmental Monitoring and Assessment, 2018

*Cyprus is an island country in the Eastern Mediterranean whose economy is largely dependent on coastal tourism. It boasts some of the cleanest waters in Europe and has the largest number of Blue Flag awarded beaches per capita in the world. These beaches are managed by local authorities and are regularly cleaned, throughout the year, at least once per day. This paper presents findings from cleanups that were organized over the summers of 2016 and 2017 on nine Blue Flag beaches around the island of Cyprus, after the beaches were cleaned by the responsible authorities. The aim was to answer the following questions: 'Are regular beach cleanups by local authorities efficient?' and 'What is left on a "clean" beach?' The results suggest that local authority cleanup efforts are quite successful at collecting larger pieces of marine litter, leaving the beach seemingly clean. However, small pieces of litter, such as cigarette butts and small pieces of plastic items related to recreational activities, remain on the beach. They likely accumulate or are buried over time, with some items becoming a nuisance to beach goers and a potential source of marine litter.*

## [Early-Phase Dynamics in Coral Recovery Following Cyclone Disturbance on the Inshore Great Barrier Reef, Australia](#)

Y Sato, SC Bell, C Nichols, K Fry, P Menéndez... - Coral Reefs, 2018

*Coral recovery (the restoration of abundance and composition of coral communities) after disturbance is a key process that determines the resilience of reef ecosystems. To understand the mechanisms underlying the recovery process of coral communities, colony abundance and size distribution were followed on reefs around Pelorus Island, located in the inshore central region of the Great Barrier Reef, following a severe tropical cyclone in 2011 that caused dramatic loss of coral communities. Permanent quadrats (600 m<sup>2</sup>) were monitored biannually between 2012 and 2016, and individual coral colonies were counted, sized and categorized into morphological types. The abundance of coral recruits and coral cover were also examined using permanent quadrats and random line intercept transects, respectively.*

## [Uncertainty in Marine Invasion Science](#)

S Katsanevakis, AA Moustakas - Frontiers in Marine Science, 2018

*Uncertainty can be considered as an attribute of (or reciprocally lack of) information. Nevertheless, this vital attribute is usually missing from marine invasion science studies, despite the fact that methods such as Monte Carlo simulations, sensitivity analysis, Bayesian uncertainty assessment, and Latin hypercube sampling appear more frequently in the ecological literature. Most studies of marine invasions are plagued by uncertainties, which in most cases are totally ignored or if acknowledged are not properly addressed or quantified. Herein we provide some examples of uncertainties in invasion science, aiming to highlight the existing gaps and stress the need for the*

development and implementation of frameworks, methods and tools that will assist invasion biologists to adequately tackle uncertainty.

[\[HTML\] Artificial Intelligence and Earth Observation to Explore Water Quality in the Wadden Sea](#)

L Ceccaroni, F Velickovski, M Blaas, MR Wernand... - ... Observation Open Science ..., 2018

*Earth-observation systems (satellites and in situ monitoring) are routinely used to collect information about water quality. Recently, smartphone-based tools and other citizen-science sensors have enabled citizens to also contribute to the collection of scientifically relevant data. This chapter describes a decision support system used to predict optical water-quality indicators in the Wadden Sea, which is an intertidal marine system, where natural processes related to sediment transport and primary production define the basis of its ecological values. As information sources, the system uses satellite data, data collected with a mobile app and physical data for the period 2003–2015. An artificial-intelligence technique, inductive learning, is used to analyze the data and provide predictions in terms of water colour represented via the Forel-Ule scale (a comparative scale for colour).*

[\[PDF\] Advancing Citizen Science for Coastal and Ocean Research](#)

C Carcia-Soto, GI van der Meeren - European Marine Board IVZW, 2017

*Citizen Science is an approach which involves members of the public in gathering scientific data and, in more advanced cases, also involves them in the analysis of such data and in the design of scientific research. Benefits of this approach include enhancing monitoring capabilities, empowering citizens and increasing Ocean Literacy, which can itself lead to the development of environmentally-friendly behaviours. There is a long history of citizen participation in science as a general concept. However, the process of studying and understanding the best ways to develop, implement, and evaluate Citizen Science is just beginning and it has recently been proposed that the study of the process and outcomes of Citizen Science merits acknowledgement as a distinct discipline in its own right. Considering the vastness of the ocean, the extensiveness of the world's coastlines, and the diversity of habitats, communities and species, a full scientific exploration and understanding of this realm requires intensive research and observation activities over time and space. Citizen Science is a potentially powerful tool for the generation of scientific knowledge to a level that would not be possible for the scientific community alone. Additionally, Citizen Science initiatives should be promoted because of their benefits in creating awareness of the challenges facing the world's ocean and increasing Ocean Literacy.*

[\[PDF\] New Data on the Occurrence of the Critically Endangered Common Angelshark, \*Squatina Squatina\*, in the Croatian Adriatic Sea](#)

D Holcer, B Lazar - *Natura Croatica: Periodicum Musei Historiae Naturalis* ..., 2017

*Two out of three critically endangered species of angelsharks inhabiting the Mediterranean have been recorded in the Adriatic Sea, namely smoothback angelshark and common angelshark. Our analysis showed that this formerly abundant species is still present in the Adriatic Sea, emphasizing the importance of implementing novel approaches, such as citizen-science programmes, in studying its current distribution. Although the legal framework for angelshark conservation already exists, poor implementation and lack of any species-specific conservation measures will most probably result in further population declines and extinction of common angelshark from the Adriatic Sea.*

[\[PDF\] Black Oystercatcher \(\*Haematopus bachmani\*\) Statewide Reproductive Performance in California in 2012-2014](#)

AL Harvey, A Weinstein, K Krieger, L Lee - Audubon, 2017

*Monitoring methodology. The citizen science nest monitoring effort was led by regional coordinators who organized surveys, provided training, and compiled data sheets. Nesting surveys were conducted using binoculars or spotting scopes from land or boat observation points. Surveys were conducted at least every seven days; in some locations, more frequent (up to daily) observations of selected nests were made. Nesting stage was recorded by identifying the presence or absence of*

adults, eggs, and chicks. Annual data were submitted to Audubon California via annual reports and/or raw data sheets.

[Assessment of Microplastics Marine Pollution from an Environmental NGO's Point of View: The First Study About the Widespread Presence of Plastic Pellets Along the ...](#)  
S Di Vito, G Zampetti, M Sighicelli, S Carpentieri... - Proceedings of the ..., 2018

*Raw materials used for the fabrication of plastic products, namely pellets or nurdles are an important source of microplastics dispersed in the marine environment. They can reach the environment for accidental loss during transportation or as result of an improper handling.... According to this, at the European level the primary source of data of pellet pollution in the environment is citizen science/non-governmental organization collected data on the density or presence/absence of pellets on European beaches, rivers and lakes.*

[Microbial Degradation of HDPE Secondary Microplastics: Preliminary Results](#)  
P Tsiota, K Karkanorachaki, E Syranidou, M Franchini... - Proceedings of the ..., 2018

*Plastic debris represents a significant problem among the various problems facing the marine environment. In this work, we aim to explore the ability of two marine indigenous communities to degrade secondary microplastics. Polyethylene (low-density as well as high-density polyethylene) films were exposed to UV radiation until they were fragmented to microplastics under mild mechanical stress. Next, 50 mg of sterile microplastics with size 2 mm–250 µm was added into sterile flasks and was incubated separately with these two pelagic microbiomes. A significant decrease in the weight of microplastics was determined along the experimental period, implying the potential ability of indigenous communities to in situ degrade secondary microplastics. Moreover, the protein content marginally decreased while carbohydrate content of both treatments increased at this time interval. Accordingly, the populations increased along experimental period.*

[\[PDF\] Social licence through citizen science: A tool for marine conservation](#)  
R Kelly, A Fleming, G Pecl, A Richter, A Bonn - bioRxiv, 2018

*Marine citizen science can serve as a valuable platform on which to connect the public to ocean environments, but it should not be assumed that participants will automatically support ocean protection or conservation management. Generating social licence through marine citizen science requires developing meaningful relationships with participants and earning their trust through engagement, education, sharing of information, dialogue and transparency. Achieving such objectives in Europe requires planning resources and expertise, which many European marine citizen science projects do not have access to. Marine citizen science needs more and improved funding. Powerful actors such as the EU Commission (i.e. EMB) can amend this by defining and providing policy direction and support. Citizen science can increase social licence for conservation. With decreasing trust in government, active and meaningful public engagement in science and data collection is needed to foster informed and publically-accepted natural resource management.*

[Tracking Nemo: Help Scientists Understand Zebrafish Behavior](#)  
TJ Tolbert, S Nakayama, M Porfiri - Zebrafish, 2018

*Tracking zebrafish (Nemo) from video recordings offers volunteers the opportunity to contribute to science by manually correcting tracked trajectory data from their personal computers. Researchers can upload their videos that require human intervention for correcting and validating the data. Citizen scientists can monitor their contributions through a leaderboard system, which is designed to strengthen participant retention and contribution by tapping into intrinsic and extrinsic motivations. Tracking Nemo is expected to help scientists improve data accuracy through the involvement of citizen scientists, who, in turn, engage in an authentic research activity and learn more about the behavior of zebrafish. In this study, we present the development of an online citizen science platform, Tracking Nemo, to improve data accuracy on swimming trajectories of zebrafish groups ... We envision to mitigate this problem by leveraging the notion of citizen science ...*

[\[PDF\] I3S Pattern as a Mark-Recapture Tool to Identify Captured and Free-Swimming Sea Turtles: an Assessment](#)

B Calmanovici, D Waayers, J Reisser, J Clifton... - *Marine Ecology Progress ...*, 2018

*Identifying individual sea turtles is essential for understanding population dynamics and, in turn, planning conservation efforts. Traditionally, sea turtle individuals are identified through the application of external flipper tags and/or internal passive integrated transponders (PITs). However, sea turtle identification and consequently population studies are hampered by the loss of external flipper tags and migration of PITs. In this study, we assessed the accuracy and time efficiency of the Interactive Individual Identification System software to photo-identify facial patterns of immature captured and free-swimming green turtles and hawksbill turtles. Using a library of 436 photos representing 189 sea turtle individuals, we evaluated the accuracy and time taken for I<sup>3</sup>S Pattern to match individuals. The widespread availability of digital cameras also provides a significant opportunity for encouraging citizen science contributions to sea turtle research.*

[Modeling urban coastal flood severity from crowd-sourced flood reports using Poisson regression and Random Forest](#)

JM Sadler, JL Goodall, MM Morsy, K Spencer - *Journal of Hydrology*, 2018

*Sea level rise has already caused more frequent and severe [coastal flooding](#) and this trend will likely continue. Flood prediction is an essential part of a coastal city's capacity to adapt to and mitigate this growing problem. Complex coastal urban hydrological systems however, do not always lend themselves easily to physically-based flood prediction approaches. This paper presents a method for using a data-driven approach to estimate flood severity in an urban coastal setting using crowd-sourced data, a non-traditional but growing data source, along with environmental observation data. Two data-driven models, Poisson regression and Random Forest regression, are trained to predict the number of flood reports per storm event as a proxy for flood severity, given extensive environmental data (i.e., rainfall, tide, [groundwater table](#) level, and wind conditions) as input. The method is demonstrated using data from Norfolk, Virginia USA from September 2010 to October 2016. Quality-controlled, crowd-sourced street flooding reports ranging from 1 to 159 per storm event for 45 storm events are used to train and evaluate the models.*

[Oyster Restoration in Galveston Bay: Can citizen scientists help monitor spat recruitment?](#)

EA Miller - *Summer Undergraduate Research Fellowship*, 2017

*Oysters (*Crassostrea virginica*) provide many services for Galveston Bay, Texas, but have been in decline; there are currently efforts being made to restore historic sites of oyster reefs. Citizen science projects use individual volunteers in the public, working with professional scientists, to collect large amounts of data and has a lower associated cost. This study is one of the first to examine the feasibility of a citizen scientist project that could quantify long term larval recruitment for oysters within Galveston Bay and the importance of recruitment for reef structure. Citizen science projects use individual volunteers in the public, working with professional scientists, to collect large amounts of data and has a lower associated cost.*

[Marine environment microfiber contamination: Global patterns and the diversity of microparticle origins](#)

APW Barrows, SE Cathey, CW Petersen - *Environmental Pollution*, 2018

*Microplastic and microfiber pollution has been documented in all major [ocean basins](#). Microfibers are one of the most common microparticle pollutants along shorelines. Over 9 million tons of fibers are produced annually; 60% are synthetic and 25% are non-synthetic. Non-synthetic and semi-synthetic microfibers are infrequently documented and not typically included in marine environment impact analyses, resulting in underestimation of a potentially pervasive and harmful pollutant. We present the most extensive worldwide microparticle distribution dataset. Our citizen scientist driven study shows a global microparticle average of  $11.8 \pm 24.0$  particles  $L^{-1}$  (mean  $\pm$  SD), approximately three orders of magnitude higher than global model predictions. Open ocean samples showed consistently higher densities than coastal samples, with the highest concentrations found in the polar oceans.*

[\[PDF\] A Large-Scale Study of Competition of Two Temperate Reef Fishes: Temperature, Functional Diversity, and Regional Differences in Dynamics](#)

DW Johnson, A Dunk - *Marine Ecology Progress Series*, 2018

*The dynamics of populations are influenced by competition, both within species and among species. However, the strength of both forms of competition may be modified by environmental factors such as temperature and food availability, and it is not always clear how competition varies throughout a broad geographic range. We examined competition within and between 2 species of temperate reef fish, the black surfperchi and the striped surfperch. Using data collected by an organization of citizen scientists, we measured competition by analyzing (co)variation in time-series estimates of densities for both species at many locations along the California coast (86 sites spread across ~1050 km). We examined whether competition varied between Northern California (a region characterized by cold water and high food availability) and Southern California (a region characterized by warm water and low food availability).*

[Lasers, Penguins, and Polar Bears: Novel Outreach and Education Approaches for NASA'S ICESAT-2 Mission](#)

VA Casasanto, B Campbell, A Manrique, K Ramsayer... - *Acta Astronautica*, 2018

*NASA's Ice, Cloud, and land Elevation Satellite (ICESat-2) emphasis on polar ice, as well as its unique measurement approach, will provide an intriguing and accessible focus for the mission's education and outreach programs. Sea ice and land ice are areas that have experienced significant change in recent years. It is key to communicate why we are measuring these areas and their importance. ICESat-2 science data will provide much-needed answers to climate change questions such as, "Is the ice really melting in the polar regions?" and "What does studying Earth's frozen regions tell us about our changing climate?" In this paper, lessons-learned and novel techniques for engaging and educating all audiences in the mission will be discussed, such as including results of a unique collaboration with art design school the Savannah College of Art Design (SCAD) to create fun and exciting products such as animated characters and interactive stories.*

[Building Trust Among Marine Protected Area Managers and Community Members Through Scientific Research: Insights from the Ningaloo Marine Park, Australia](#)

C Cvitanovic, El van Putten, AJ Hobday, M Mackay... - *Marine Policy*, 2018

*The success of participatory marine governance arrangements is influenced by the levels of trust that exist between decision-makers and diverse stakeholder groups within the community. While the benefits of high levels of trust among these groups is well established, specific approaches to building trust remain largely unknown. The aim of this study is to understand the extent to which scientific research programs can enhance trust among [marine protected area](#) (MPA) managers and community members via an evaluation of the Ningaloo Research Program - a large-scale program of marine research in the Ningaloo [Marine Park](#). Results from a survey of 125 local residents show that community members along the Ningaloo coast believe that scientific research is important for the management of the marine park, and strongly support government investment in scientific research in the region.*

[Using eOceans Diver Data to Describe Contemporary Patterns of Marine Animal Populations: a Case Study of Sharks in Thailand](#)

CA Ward-Paige, A Westell, B Sing - *Ocean & Coastal Management*, 2018

*Many marine animals around the world are threatened by a variety of anthropogenic activities, yet there is often a paucity of data to monitor patterns in abundance and distribution or to evaluate human interventions. The new citizen science program eOceans helps to fill this gap by gathering observations of various marine animals from worldwide ocean explorers. In 2012, a dedicated Thailand-wide census of sharks, and other animals, began as a collaboration between eOceans scientists and the dive tourism industry. Using the observations from 9524 dives (9357 h underwater) logged by 169 divers on 153 sites, we describe the spatial and temporal patterns of sharks in coastal Thailand. A total of 12 shark species were encountered, most commonly (67%) as individuals, and were observed on 11% of all dives, on 59% of sites, in all months and years. This study highlights the*

value that collaborative citizen science projects could have in support of marine science, management and conservation efforts worldwide.

### [Microplastics in the Southern Ocean](#)

CL Waller, HJ Griffiths, CM Waluda, SE Thorpe... - *Antarctic Environments ...*, 2018

*The Southern Ocean has the lowest densities of floating macroplastic litter in the world. It was thought that the region was relatively free of microplastic contamination. However, recent studies and citizen science projects have reported microplastics in deep-sea and shallow sediments and surface waters. Microplastics have been shown, in both laboratory experiments and field-based studies elsewhere in the world, to negatively impact a range of marine species including pelagic and benthic organisms. After reviewing available information on microplastics (including macroplastics as a source of microplastics) in the Southern Ocean, we present estimated microplastic concentrations, and identify potential sources and routes of transmission into the region. Estimates suggest that the amounts of microplastic pollution released into the region from ships and scientific research stations are likely to be negligible at the scale of the Southern Ocean, but may be significant on a local scale. Furthermore, predictions of microplastic concentrations from local sources are several orders of magnitude lower than levels reported in published sampling surveys. Sea surface transfer from lower latitudes is a likely contributor to Southern Ocean plastic concentrations.*

[\[PDF\] Exploring the influence of citizen involvement on the assimilation of crowdsourced observations: a modelling study based on the 2013 flood event in the Bacchiglione ...](#)

Mazzoleni M., Cortes Arevalo V. J., Wehn U., Alfonso L., Norbiato D., Monego M. - *Hydrology and earth system sciences*, v. 22 N1, p. 391-416.

*To improve hydrological predictions, real-time measurements derived from traditional physical sensors are integrated within mathematic models. Recently, traditional sensors are being complemented with crowdsourced data (social sensors). Although measurements from social sensors can be low cost and more spatially distributed, other factors like spatial variability of citizen involvement, decreasing involvement over time, variable observations accuracy and feasibility for model assimilation play an important role in accurate flood predictions. Only a few studies have investigated the benefit of assimilating uncertain crowdsourced data in hydrological and hydraulic models. In this study, we investigate the usefulness of assimilating crowdsourced observations from a heterogeneous network of static physical, static social and dynamic social sensors. We assess improvements in the model prediction performance for different spatial-temporal scenarios of citizen involvement levels.*

[\[PDF\] Monitoring macro & micro plastic in Pelagos Sanctuary: a citizen science successful approach](#)

S Merlino, M Abbate, M Locritani, S Aliani, M Bianucci - *International Marine Debris ...*, 2018

*SeaCleaner: Focusing Citizen Science and Environment Education on Unraveling the Marine Litter Problem. Twenty-five schools attended the activities proposed by SEACleaner and SEACleanerII in the last 5 years. Students participating in such scientific experiences come up with a knowledge of what is the field-proven scientific method and a wealth of experience that leads them to better apply their knowledge and acquire skills that are hardly obtainable in the classroom. Additionally, this is often accompanied by increased confidence in their abilities (non-formal learning and emotion-based learning).*

[Citizen science monitoring of marine protected areas: Case studies and recommendations for integration into monitoring programs](#)

J Freiwald, R Meyer, JE Caselle, CA Blanchette... - *Marine Ecology*, 2018

*Ecosystem based management and conservation approaches such as marine protected areas (MPAs) require large amounts of ecological data to be implemented and adaptively managed. Recently, many citizen science programs have endeavored to help provide these much-needed data. Implementation of MPAs under the Marine Life Protection Act (MLPA) Initiative in Southern California was followed by a monitoring program to establish a comprehensive baseline of the*

ecological conditions of several marine ecosystems at the time of MPA implementation. This baseline monitoring consortium involved several citizen science monitoring programs alongside more traditional academic monitoring programs, creating an opportunity to evaluate the potential for citizen scientists to become more involved in future long-term monitoring efforts. We investigated different citizen science models, their program goals, and contributions to MPA baseline monitoring, including their respective monitoring protocols and data quality assurance measures, in the context of the goals of the MLPA baseline monitoring program.

[\[PDF\] Is citizen science a valid tool to monitor the occurrence of jellyfish? The Spot the Jellyfish case study from the Maltese Islands](#)

MP Gatt, A Deidun, A Galea, A Gauci - 2018

*The potential of citizen science in monitoring transient biological phenomena occurring over large spatial scales, such as the blooming of jellyfish species, has received increased acknowledgment in recent years. The Spot the Jellyfish citizen science campaign was launched by the International Ocean Institute and by the University of Malta in the summer of 2010, with thousands of jellyfish spotting reports having been submitted by sea-users through the campaign website, social media site, smart phone app or even through email, since then. The 2011–2015 submitted jellyfish reports were analysed, besides a number of water quality parameters (temperature, salinity, chlorophyll a content, nutrient and phytoplankton concentration), whose values were gleaned for the marine area of interest through online satellite water quality data portals.*

[Spatial and temporal settlement patterns of blue crab \(\*Callinectes sapidus\* and \*Callinectes similis\*\) megalopae in a drought-prone Texas estuary](#)

TF Weatherall, LP Scheef, EJ Buskey - *Estuarine, Coastal and Shelf Science*, 2018

*To investigate blue crab larval recruitment patterns, citizen scientist volunteers used hogshair settlement collectors to sample five monitoring sites over a four year period. Results show that large numbers of blue crab megalopae are common in [nearshore waters](#) of the Gulf of Mexico, but only a small fraction (1%) recruit into the estuary. Peak periods of ingress into the estuary occur during fall and winter months.*

[Evaluating Differences in Outcomes and Participant Perspectives in Marine Science Professional Development Conducted by Informal Educators Compared to ...](#)

T Goodale, C Sakas - *Exemplary Practices in Marine Science Education*, 2019

*This chapter will utilize evaluation measures from two separate in-service teacher professional development initiatives that focused on marine science and ocean literacy. Each of these workshops presented content and provided for field-based study in regard to marine science research and applications for school classrooms. Content conveyed included coastal zone processes, marine ecology, biodiversity, fisheries management, and marine engineering and technology. The focus of this chapter will center on a unique variation that occurred in the teacher training in that content and activities were led either by an informal science educator (a trained educator that does not teach in the traditional K-12 classroom) or a highly specialized university professor or researcher. Participants were pre- and post-tested on their knowledge gains with respect to the applicable presented material.*

[\[PDF\] Monitoring Biological and Chemical Trends in Temperate Still Waters Using Citizen Science](#)

I Thornhill, A Chautard, S Loiselle - *Water*, 2018

*The involvement of volunteers in the monitoring of the environment holds great potential to gather information on a wider temporal and spatial scale than is currently possible. However, the mass involvement of citizens in monitoring freshwater health is a relatively new field and subject to uncertainty. Here, we examine 1192 samples collected across 46 temperate ponds (<2 ha) and 29 temperate lakes (>2 ha) by 120 volunteers trained through the FreshWater Watch citizen science programme to consider if the approach is able to (a) identify well established patterns in water quality and biological indicators (i.e., fish), and (b) provide a potentially useful basis for the identification of pollution sources in urban or peri-urban landscapes. Seasonal patterns observed agreed well with*

*established principles of nutrient dynamics, algal bloom seasonality, and broad biological trends between ponds and lakes. Further, observational data collected by the volunteers suggested plausible links between the presence of residential discharge and water level fluctuation and significant increases in algal bloom observations between peri-urban and urban sites. We suggest that citizen science can have a role to play in complementing regulatory monitoring efforts and that local citizens should be empowered to become stewards of their local freshwater resources.*

[PDF] [Monitoring Through Many Eyes: Integrating Scientific and Crowd-Sourced Datasets to Improve Monitoring of The Great Barrier Reef](#)

EE Peterson, E Santos-Fernández, C Chen, S Clifford... - arXiv preprint arXiv ..., 2018

*Data in the Great Barrier Reef (GBR) are collected by numerous organisations and rarely analysed together. We developed a weighted spatiotemporal Bayesian model that integrate datasets, while accounting for differences in method and quality, which we fit to image based, hard coral data collected by professional and citizen scientists. Citizens provided underwater images and classified those images. We used the model to make coral-cover predictions across the GBR with estimates of uncertainty. A simulation study was undertaken to investigate how citizen-science data affects model outputs as participation increases. The citizens average classification accuracy (79 percent) was relatively high compared to marine scientists (assumed 100 percent), but variability in most participants accuracy was also high. Though, a large number of citizens (greater than 1000) must classify images before their data affects model outputs. Including additional data increased the models predictive ability by 43 percent, suggesting that a loss of much-needed management information occurs when data are not integrated.*

[HTML] [Marine Conservation Outcomes are More Likely when Fishers Participate as Citizen Scientists: Case Studies from the Mexican Mesoamerican Reef](#)

S Fulton, J Caamal-Madriral, A Aguilar-Perera... - Citizen Science: Theory and ..., 2018

*Small-scale fishers on Caribbean coral reefs have exploited fish spawning aggregations (FSAs) for generations, but intense fishing has led to the loss of traditional aggregation sites. In many areas, the traditional ecological knowledge (TEK) of fishers has contributed greatly to the characterization of spawning aggregations and implementation of local conservation initiatives. TEK has identified more than 40 potential FSA sites along the coast of the Mexican Mesoamerican Reef. These sites have been characterised and scientifically validated, in some cases with traditional western science and in others, with a participatory citizen-science approach. The objective of this work is to compare the science and conservation outcomes at these FSA sites. We report that those FSA sites where scientific surveys were conducted without community participation remain unprotected. By contrast, the FSAs where local fishers were engaged in characterization and subsequent monitoring are now protected at the behest of the fishers themselves. Conservation initiatives to protect FSAs can be more effective through a combination of TEK, western science, and participatory citizen science involving local fishers.*

[SPLASSH: A Collaborative Web-Based Application That Crowdsources Environmental Data in Real Time](#)

LG Adams, JN Mwaniki, SJ Dabdoub, MG Adams - Marine Technology Society ..., 2018

*SPLASSH (Student Programs Like Aquatic Science Sampling Headquarters, <https://splash.org>) is a collaborative web-based application that crowdsources environmental data in real time. Originally launched in 2014, SPLASSH beta version 1.0 was designed to showcase water projects conducted by students. Through its development, it has broadened its reach from students to educators (formal and informal), researchers, resource managers, science professionals, and the public (citizen scientists). SPLASSH's beta version 2.0 (Patent Pending) has an innovative, customizable environmental tracker and project management capabilities that foster community building through collaboration. SPLASSH offers the public an opportunity to contribute more than just data to an existing project. It encourages citizens to play a lead role by initiating their own projects, truly validating and broadening the definition of citizen science. Learning and project outcomes will be measured for their impact and effectiveness.*

## Акустика

Добровольческие проекты с «акустическим содержанием» часто пересекаются с проектами кооперативного зондирования, поэтому некоторые работы этого раздела приведены также и разделе выше. Направления проектов: имеется четкое деление на две группы (а) мониторинг городских шумов и (б) запись образцов пения птиц (с возможной последующей обработкой сигнала на месте). В большинстве проектов обоих направлений в качестве приемника звука используются датчики смартфонов добровольцев в сочетании со специальными приложениями, хотя бывают и исключения. Интересно отметить, что исторически первый российский научный краудсорсинговый проект был связан именно со звуком, хотя акустика и не была его целью. Начиная с 2000 года, Союз охраны птиц России в конце мая проводил в крупных городах детектирование случаев соловьиного пения, т.к. наличие брачующихся соловьев в городе - важный экологический признак. Жителей просили звонить по определенному телефону и указывать район города, в котором отмечались эти случаи. Как уже указывалось, за неимением тогда других терминов, эти проекты носили название народного мониторинга. Подробнее о проекте см. <http://rbcu.ru/campaign/1753>.

### [Listening to the sounds of the biosphere](#)

M Gross - 2018

*The sounds that living organisms make can help biologists to identify, track and study individuals and populations, but also to understand their interactions with their environment, which comes with its own tapestry of sound that may help or hinder the species. This realisation, along with technology enabling the analysis of complex sound mixtures, has produced a new field now known as soundscape ecology. One of its strengths is its ability to provide a simple assessment of how biotopes respond to environmental change.*

### [Stop the Noise! Enhancing Meaningfulness in Participatory Sensing with Community Level Indicators](#)

S Coulson, M Woods, M Scott, D Hemment... - Proceedings of the 2018 on ..., 2018

*In this paper are examined ways to make data more meaningful and useful for citizens in participatory sensing. Participatory sensing has evolved as a digitally enabled grassroots approach to data collection for citizens with shared concerns. However, citizens often struggle to understand data in relation to their daily lives, and use them effectively. This paper presents a qualitative study on the development of a novel approach to Community Level Indicators (CLIs) during two participatory sensing projects focused on noise pollution. It investigates how CLIs can provide an infrastructure to address challenges in participatory sensing, specifically, making data meaningful and useful for non-experts. Furthermore, we consider how this approach moves towards an ambition of achieving change and impact through participatory sensing and discuss the challenges in this way of working and provide recommendations for future use of CLIs.*

### [\[PDF\] SONYC: A System for the Monitoring, Analysis and Mitigation of Urban Noise Pollution](#)

JP Bello, C Silva, O Nov, RL DuBois, A Arora... - arXiv preprint arXiv ..., 2018

*Citizen Science and civic participation: the role of humans in SONYC is not limited to annotating sound. In addition to the fixed sensors located in various parts of New York City, a SONYC mobile platform is expected to enable citizens to record and annotate sounds in situ, view existing data contributed and analyzed by others, and contact authorities about noise-related concerns. A mobile platform will allow users to leverage slices taken from this rich set of data to describe their concerns, and support them with evidence, as they approach city authorities, regulators, and policy makers. Citizens will not only be more informed and more engaged with their environment, but also better equipped in voicing their concerns in effective ways as they interact with authorities.*

[\[HTML\] A Call to Document Female Bird Songs: Applications for Diverse Fields](#)

KJ Odom, L Benedict - *The Auk*, 2018

*Research on bird song has contributed to important advances in diverse biological fields from neurobiology to conservation biology. Bird song has traditionally been studied as an elaborate male trait, but female song is also widespread in both temperate and tropical species and likely evolved in the early ancestors of modern songbirds. However, female song is underrepresented in biological collections compared to male song, and we lack documentation of female songs for most songbird species. Better documentation of female bird song is necessary for an understanding of the prevalence, regulation, function, evolution, and conservation applications of avian vocalizations. Therefore, we call on all researchers to disseminate their observations of female bird song, and to spread the word among other researchers, students, field technicians, and citizen scientists that many female songbirds sing. To this end, we provide resources for disseminating recordings and written documentation of female song, including best practices for documentation, venues for archiving and publishing, and our citizen science project, the Female Bird Song Project.*

[Participatory Noise Mapping: Harnessing the Potential of Smartphones Through the Development of a Dedicated Citizen-Science Platform](#)

EA King, A Tatoglu, RD Celmer - *ASME 2017 International Mechanical Engineering ...*, 2017

*This paper presents results of an ongoing project which aims to develop a purpose-built platform for using smart phones as alternative to sound level meters for citizen-science based environment noise assessment. In order to manage and control environmental noise effectively, the extent of the problem must first be quantified. Across the world, strategic noise maps are used to assess the impact of environmental noise in cities. Traditionally, these maps are developed using predictive techniques, but some authors have advocated the use of noise measurements to develop more reliable and robust noise maps. If adopted correctly, smartphones have the capability to revolutionize the manner in which environmental noise assessments are performed. The development of smartphone technology, and its impact on environmental noise studies, has recently begun to receive attention in the academic literature. Recent research has assessed the capability of existing smartphone applications (apps) to be utilized as an alternative low-cost solution to traditional noise monitoring. Results show that the accuracy of current noise measurement apps varies widely relative to pre-specified reference levels.*

[\[HTML\] Using Occupancy Modeling to Monitor Dates of Peak Vocal Activity for Passerines in California](#)

BJ Furnas, MC McGrann - *The Condor*, 2018

*Advancement in timing of important life history events for birds due to climate change presents conservation and monitoring challenges. Song and other vocal activity are strong indicators of avian phenology because they correspond to territorial defense and mate attraction during the breeding season. We combined data from 2 projects using point counts and automated sound recorders to survey passerines during the breeding season in northern California, USA (553 sites, 2009–2011). We used multi-species occupancy modeling to estimate how detection probability based on vocalizations varied over the course of the breeding season. We estimated dates of peak vocal activity, which we reasoned were indicative of reproductive phenology. We demonstrated a strong unimodal relationship between vocal activity and survey date for 8 focal species for which average detectability peaked on June 21. Although we found no difference in peak dates of average detectability for migrants vs. residents, the variability of this estimate was lowest for Neotropical migrants compared to residents and elevational migrants.*

[Our Dull Roar](#)

C Benitez - *Wildlife Australia*, 2017

*Using acoustic data to monitor the health of a habitat has been gaining momentum for years and bioacoustic technology is now accelerating research. With noise pollution sifting through to even the most remote and pristine habitats, Carolina Benitez explains how the growing discipline of soundscape ecology seeks to measure the impact of human sounds and listen for nature's reply.*

### [Birdsound: Enticing Urban Dwellers to Engage with Local Birds around their Home](#)

M Sankupellay, A Kalma, S Magin, JL Cappadonna... - Proceedings of the 29th ..., 2017

*Many projects seek to engage urban dwellers to learn about local birds. However, many of these projects require some background knowledge that can be difficult to obtain independently. Our project explores how to make engaging with and learning about local birds easier. To do this, we designed and developed BirdSound, a device that engages people to record nature sounds and learn to identify bird species by sight and sound. We conducted contextual interviews with six people living in an urban environment, who were curious but not experienced in birdwatching. These interviews aided in attaining present frame of knowledge held by each participant. Then, we explored how these participants interacted with BirdSound in their homes. BirdSound sparked participants to recount experiences with the device, social interactions and knowledge of birds. BirdSound use required intense focus, and we can envisage more ambient approaches that also support more social forms of learning.*

## **Верхние слои атмосферы, космос, космология**

Добровольческие проекты в данной области являются рекордсменами по числу участников и масштабам известности и привлекаемым вычислительным мощностям. Классическим проектом в данной области является проект Galaxy Zoo — интернет-проект по классификации различных типов галактик. Пользователям ставится задача классифицировать изображения удаленных астрономических объектов. Большое влияние на последующие проекты оказал уже упоминавшийся проект SETI@home (Search for Extra-Terrestrial Intelligence at Home — поиск внеземного разума на дому) — научный некоммерческий проект добровольных вычислений на платформе BOINC. Вычислительные ресурсы на компьютерах добровольцев используются для анализа радиосигналов, полученных проектом SETI. К числу известных астрономических проектов относятся также MilkyWay@home и Einstein@home.

### [New Science in Plain Sight: Citizen Scientists Lead to Discovery of Optical Structure in the Upper Atmosphere](#)

E MacDonald, E Donovan, Y Nishimura, NA Case... - Science Advances, 2018

*A glowing ribbon of purple light running east-west in the night sky has recently been observed by citizen scientists. This narrow, subauroral, visible structure, distinct from the traditional auroral oval, was largely undocumented in the scientific literature and little was known about its formation. Amateur photo sequences showed colors distinctly different from common types of aurora and occasionally indicated magnetic field-aligned substructures. Observations from the Swarm satellite as it crossed the arc have revealed an unusual level of electron temperature enhancement and density depletion, along with a strong westward ion flow, indicating that a pronounced subauroral ion drift (SAID) is associated with this structure. These early results suggest the arc is an optical manifestation of SAID, presenting new opportunities for investigation of the dynamic SAID signatures from the ground. On the basis of the measured ion properties and original citizen science name, we propose to identify this arc as a Strong Thermal Emission Velocity Enhancement (STEVE).*

### [A Case Study Comparing Citizen Science Aurora Data with Global Auroral Boundaries Derived from Satellite Imagery and Empirical Models](#)

BC Kosar, EA MacDonald, NA Case, Y Zhang... - Journal of Atmospheric and ..., 2018

*Aurorasaurus is a citizen science project that offers a new, global data source consisting of ground-based reports of the aurora. For this case study, aurora data collected during the 17–18 March 2015 geomagnetic storm are examined to identify their conjunctions with [Defense Meteorological Satellite Program](#) (DMSP) satellite passes over the high latitude auroral regions. This unique set of aurora data can provide ground-truth validation of existing auroral precipitation models. Particularly, the [solar wind](#) driven, Oval Variation, Assessment, Tracking, Intensity, and Online [Nowcasting](#) (OVATION) Prime 2013 (OP-13) model and a Kp-dependent model of Zhang-*

*Paxton (Z-P) are utilized for our boundary validation efforts. These two similar models are compared for the first time.*

### [Embracing Diversity: The Exploration of User Motivations in Citizen Science Astronomy Projects](#)

L Lee - American Astronomical Society Meeting Abstracts# 232, 2018

*Online citizen science projects ask members of the public to donate spare time on their personal computers to process large datasets. A critical challenge for these projects is volunteer recruitment and retention. Many of these projects use Berkeley Open Infrastructure for Network Computing (BOINC), a piece of middleware, to support their operations. This poster analyzes volunteer motivations in two large, BOINC-based astronomy projects, Einstein@Home and Cosmology@Home. Volunteer opinions are addressed to assess whether and how competitive elements, such as credit and ranking systems, motivate volunteers. By analyzing user motivations in astronomical BOINC projects, this research provides scientists with deeper understandings about volunteer communities and various types of volunteers. Building on these findings, scientists can develop different strategies, for example, awarding volunteers badges, to recruit and retain diverse volunteers, and thus enhance long-term user participation in astronomical BOINC projects.*

### [\[PDF\] The Dark Galaxy Hypothesis](#)

M Weisberg, M Jacquart, B Madore, M Seidel - 2018

*Gravitational interactions allowed astronomers to conclude that dark matter rings all luminous galaxies in gigantic halos, but this only accounts for a fraction of the total mass of dark matter believed to exist. Where is the rest? We hypothesize that some of it resides in dark galaxies, pure dark matter halos that either never possessed or have totally lost their baryonic matter. This paper explores methodological challenges that arise due to the nature of observation in astrophysics, and examines how the blend of observation, simulation, and theory we call the Observing the Invisible approach might make detecting such dark objects possible. We have adopted a research program which we call "Observing the Invisible". This program blends simulation, citizen science, and telescope-based observations to help find these dark galaxies. This type of citizen science project is simply a giant, collective effort.*

### [\[PDF\] Crowd-Sourced Radio Science at Marshall Space Flight Center](#)

CD Fry, JK McTernan, RM Suggs, L Rawlins... - 2018

*August 21, 2017 provided a unique opportunity to investigate the effects of the total solar eclipse on high frequency (HF) radio propagation and ionospheric variability. In Marshall Space Flight Center's partnership with the US Space and Rocket Center (USSRC) and Austin Peay State University (APSU), we engaged citizen scientists and students in an investigation of the effects of an eclipse on the mid-latitude ionosphere. Activities included fieldwork and station-based data collection of HF Amateur Radio frequency bands and VLF radio waves before, during, and after the eclipse to build a continuous record of changing propagation conditions as the moon's shadow marched across the United States. Post-eclipse radio propagation analysis provided insights into ionospheric variability due to the eclipse.*

### [\[PDF\] Dataset Review—Zooniverse, the online repository for Citizen Science](#)

P Manning - Journal of World-Systems Research, 2018

*Zooniverse advertises itself as "the world's largest and most popular platform for people-powered research." Its origins are with Galaxy Zoo, a project that drew on public participation ("Citizen Science") to identify patterns in images of galaxies. That program, launched in 2007, met with immediate success and soon led to a generalized platform, "Zooniverse". As of this writing, Zooniverse has 78 separate projects of data collection and analysis, displayed in 9 disciplinary categories. Individual projects are listed in more than one discipline, but the rough totals are: 12 projects in Physics and Space, 41 projects in Nature, Biology, and Climate, 3 projects in Medicine, 7 projects in Social Science and History; and 6 projects in Arts, Language and Literature. (There is a further overlap of the projects in social sciences and humanities.)*

[SpaghettiLens: A Software Stack for Modeling Gravitational Lenses by Citizen Scientists](#)  
R Küng - Astronomy and Computing, 2018

*The 2020s are expected to see tens of thousands of lens discoveries. Mass reconstruction or modeling of these lenses will be needed, but current modeling methods are time intensive for specialists and expert human resources do not scale. SpaghettiLens approaches this challenge with the help of experienced citizen scientist volunteers who have already been involved in finding lenses. A top level description is as follows. Citizen scientists look at data and provide a graphical input based on Fermat's principle which we call a Spaghetti Diagram. This input is followed by the generation of the model, which is a compute intensive task done server side through a task distribution system. Model results are returned in graphical form to the citizen scientist, who examines and then either forwards them for forum discussion or rejects the model and retries. As well as configuring models, citizen scientists can also modify existing model configurations, which results in a version tree of models and makes the modeling process collaborative. SpaghettiLens is designed to be scalable and could be adopted to problems with similar characteristics. It is licensed under the MIT license, released at <http://labs.spacewarps.org> and the source code is available at <https://github.com/RafiKueng/SpaghettiLens>.*

[PDF] [Muon Hunter: a Zooniverse project](#)

R Bird, MK Daniel, H Dickinson, Q Feng, L Fortson... - arXiv preprint arXiv ..., 2018

*The large datasets and often low signal-to-noise inherent to the raw data of modern astroparticle experiments calls out for increasingly sophisticated event classification techniques. Machine learning algorithms, such as neural networks, have the potential to outperform traditional analysis methods, but come with the major challenge of identifying reliably classified training samples from real data. Citizen science represents an effective approach to sort through the large datasets efficiently and meet this challenge. Muon Hunter is a project hosted on the Zooniverse platform, wherein volunteers sort through pictures of data from the VERITAS cameras to identify muon ring images. Each image is classified multiple times to produce a clean dataset used to train and validate a convolutional neural network model both able to reject background events and identify suitable calibration data to monitor the telescope performance as a function of time.*

[Citizen Science as a Tool for Scientific Research and Societal Benefit at NASA](#)  
A Kaminski - 2018

*Encouraging the use of citizen science within NASA • Policy statements • Dedicated funding opportunities • Individual champions • Community of practice • Meetings/events to familiarize NASA workforce with citizen science and its applicability to their work • Workshops involving the science and open innovation communities to develop ideas for new projects*

[Galaxy Zoo: Comparing the visual morphology of synthetic galaxies from the Illustris simulation with those in the real Universe.](#)

H Dickinson, C Lintott, C Scarlata, L Fortson, S Bamford... - ... Society Meeting Abstracts, 2018

*We present a comparison between the Illustris simulations and classifications from Galaxy Zoo, aiming to test the ability of modern large-scale cosmological simulations to accurately reproduce the local galaxy population. This comparison is enabled by the increasingly high spatial and temporal resolution obtained by such surveys. Using classifications that were accumulated via the Galaxy Zoo citizen science interface, we compare the visual morphologies for simulated images of Illustris galaxies with a compatible sample of images drawn from the Sloan Digital Sky Survey (SDSS) Legacy Survey.*

## [Environments of \$z \sim 0.2\$ Star Forming Galaxies: Building on the Citizen Science Discovery of the Green Peas](#)

C Cardamone, N Cappelluti, M Powell, M Urry - American Astronomical Society ..., 2018

*'Green Pea' galaxies, discovered in the Galaxy Zoo citizen science project, are rare low-mass galaxies, experiencing an episode of compact, relatively low-metallicity, intense starformation. While their spectra have been investigated in a wide-array of follow-up studies, a detailed study of their environments is missing. Two-point correlation functions have been used to show the environmental dependence of an array of galaxy properties (eg., mass, luminosity, color, star formation, and morphology). In this study, we present a cross-correlation analysis between the Green Peas and the Luminous Red Galaxies throughout the SDSS footprint, and we find that the population of Green Peas. This suggests that this population typically reside in under-dense environments.*

## [Cosmoquest: Making the Public your Students and Collaborators](#)

P Gay, S Buxner, J Grier, M Richardson, CQ Team - American Astronomical Society ..., 2018

*CosmoQuest is a second generation citizen science project that makes it possible for NASA Subject Matter Experts to engage the public as both learners and collaborators in research. Engaging the public in publishable science is termed "Citizen Science." This is a powerful technique for accomplishing research projects and tasks that require many minds and eyes to complete. While some projects may use undergraduates for help, others simply have too many images or too much data for a small population to sort through. CosmoQuest is a platform that enables scientists to take advantage of already existing science tools to engage the public in their research and to acquire the data analysis they need. Citizen scientists, like students, need their experience properly scaffolded to their understanding, and they require mentoring and training to succeed. The content presented will allow you to successfully implement a project within the CosmoQuest facility, and determine what educational support you should provide or request aid to provide.*

## [CosmoQuest: A Glance at Citizen Science Building](#)

M Richardson, J Grier, P Gay, C Lehan, S Buxner... - ... Society Meeting Abstracts, 2018

*CosmoQuest is a virtual research facility focused on engaging people - citizen scientists - from across the world in authentic research projects designed to enhance our knowledge of the cosmos around us. Using image data acquired by NASA missions, our citizen scientists are first trained to identify specific features within the data and then requested to identify those features across large datasets. Responses submitted by the citizen scientists are then stored in our database where they await for analysis and eventual publication by CosmoQuest staff and collaborating professional research scientists. While it is clear that the driving power behind our projects are the eyes and minds of our citizen scientists, it is CosmoQuest's custom software, Citizen Science Builder (CSB), that enables citizen science to be accomplished. On the front end, CosmoQuest's CSB software allows for the creation of web-interfaces that users can access to perform image annotation through both drawing tools and questions that can accompany images. In this poster we present available tools and resources and seek potential collaborations.*

## [CosmoQuest: Measuring Audience Needs to Obtain Better Science](#)

S Buxner, M Bakerman, P Gay, A Reiheld, CQ Team - American Astronomical Society ..., 2018

*The CosmoQuest Virtual Research Facility provides a place for scientists to recruit people to aid in their science projects via citizen science. Just as students need training to be effective researchers, so do citizen scientists, but their needs are different. In this presentation, we present the results of surveys of members of the CosmoQuest community, including both citizen scientists and educators using citizen science in their classrooms. For all members of the community, we investigated the types of projects that respondents enjoyed doing, the level of difficulty they were willing to engage in, and the amount of time they spent doing citizen science projects. We also investigated what other science-related activities respondents were engaged in, other opportunities they were interested in, and what support and resources they needed to be successful in completing projects. For educators,*

we investigated the types of projects they wanted to engage in with their students, the ideal length of time for citizen science projects to be used in their classrooms, and the resources they needed to be able to engage students in citizen science projects effectively.

### [Investigating Changes in Student Attitudes and Understanding of Science through Participation in Citizen Science Projects in College Coursework](#)

C Cardamone, BE Cobb - American Astronomical Society Meeting Abstracts, 2018

Over the last decade, web-based “citizen science” projects such as the Zooniverse have allowed volunteers and professional scientists to work together for the advancement of science. While much attention has been paid to the benefits to science from these new projects, less attention has been paid to their impact on the participants and, in particular, to the projects’ potential to impact students who might engage in these projects through coursework. We report on a study engaging students in introductory astronomy classes at the George Washington University and Wheelock College in an assignment in which each student individually contributed to a “physics” or “space” citizen science project of their choice, and groups of students worked together to understand and articulate the scientific purpose of a citizen science project to which they all contributed. The project culminated with each group delivering a creative presentation that demonstrated their understanding of both the science goals of the project and the value of their own contributions to the project. In this talk, we report on the experience of the students with the project and on an assessment of the students’ attitudes toward science and knowledge of the process of science completed before the introduction of the assignment and again at its conclusion.

### [Crowdsourcing Broad Absorption Line Properties and Other Features of Quasar Outflow Using Zooniverse Citizen Science Project Platform](#)

C Crowe, B Lundgren, C Grier - American Astronomical Society Meeting Abstracts, 2018

The Sloan Digital Sky Survey (SDSS) regularly publishes vast catalogs of quasars and other astronomical objects. Previously, the SDSS collaboration has used visual inspection to check quasar redshift validity and flag instances of broad absorption lines (BALs). This information helps researchers to easily single out the quasars with BAL properties and study their outflows and other intervening gas clouds. Due to the ever-growing number of new SDSS quasar observations, visual inspections are no longer possible using previous methods. Currently, BAL information is being determined entirely computationally, and the accuracy of that information is not precisely known. This project uses the Zooniverse citizen science platform to visually inspect quasar spectra for BAL properties. The layout and format of a Zooniverse project provides an easier way to inspect and record data on each spectrum and share the workload via crowdsourcing.

### [The Backyard Worlds: Planet 9 Citizen Science Project](#)

JK Faherty, M Kuchner, A Schneider, A Meisner... - ... Society Meeting Abstracts, 2018

In February of 2017 our team launched a new citizen science project entitled Backyard Worlds: Planet 9 to scan the cosmos for fast moving stars, brown dwarfs, and even planets. This Zooniverse website, BackyardWorlds.org, invites anyone with a computer or smartphone to flip through WISE images taken over a several year baseline and mark any point source that appears to move. This “blinking technique” is the same that Clyde Tombaugh discovered Pluto with over 80 years ago. In the first few days of our program we recruited over 30,000 volunteers. Our first publication credited four citizen scientists as co-authors. The Backyard Worlds: Planet 9 project is both scientifically fruitful and empowering for any mind across the globe that has ever wanted to participate in a discovery-driven astronomy research project.

### [Assessing Motivations and Use of Online Citizen Science Astronomy Projects](#)

M Nona Bakerman, S Buxner, G Bracey, N Gugliucci - American Astronomical Society ..., 2018

Citizen science in astronomy, which has followed the model of citizen science in other scientific fields, has increased in the number and type of projects in the last few years and poses captivating ways to engage the public in science. The primary feature of this study was citizen science users’ motivations

and activities related to engaging in astronomy citizen science projects. We report on participants' interview responses related to their motivations, length and frequency of engagement, and reasons for leaving the project. Participants' reasons for ending their engagement on any given day were: having to do other things, physical effects of the computer, scheduled event that ended, attention span or tired, computer or program issues. A small fraction of the participants also indicated experiencing negative feedback. Out of the participants who no longer took part in citizen science projects, some indicated that receiving negative feedback was their primary reason and others reported the program to be frustrating. Our work is helping us to understand participants who engage in online citizen science projects so that researchers can better design projects to meet their needs and develop support materials and incentives to encourage more participation.

[\[PDF\] Galaxy Zoo: Morphological Classification of Galaxy Images from the Illustris Simulation](#)  
H Dickinson, L Fortson, C Lintott, C Scarlata, K Willett... - arXiv preprint arXiv ..., 2018

*Modern large-scale cosmological simulations model the universe with increasing sophistication and at higher spatial and temporal resolutions. These ongoing enhancements permit increasingly detailed comparisons between the simulation outputs and real observational data. Recent projects such as Illustris are capable of producing simulated images that are designed to be comparable to those obtained from local surveys. This paper tests the degree to which Illustris achieves this goal across a diverse population of galaxies using visual morphologies derived from Galaxy Zoo citizen scientists. Morphological classifications provided by these volunteers for simulated galaxies are compared with similar data for a compatible sample of images drawn from the Sloan Digital Sky Survey (SDSS) Legacy Survey. This paper investigates how simple morphological characterization by human volunteers asked to distinguish smooth from featured systems differs between simulated and real galaxy images.*

## География

Географические приложения научного краудсорсинга часто связаны с коллективной обработкой большого числа спутниковых изображений. Изображения частично перекрываются и оказываются доступными нескольким экспертам-добровольцам. Окончательные выводы по проекту производятся известными экспертными методами, а именно, добровольцам предоставляется верифицировать выводы друг друга. Имеется опыт выявления на земной поверхности ранее неизвестных артефактов и природных объектов. Нашумевшей является история проекта поиска могилы Чингисхана в Северной Монголии. В обработке спутниковых изображений фрагментов поверхности Северной Монголии участвовали более 10000 добровольцев. Могилу, к сожалению не нашли, однако обнаружили несколько десятков интересных археологических объектов, о которых ранее не подозревали. Согласно последним работам, представленным в данном разделе, направления географических приложений существенно расширились, они простираются от мониторинга рыбных ресурсов до поддержки управленческих решений на уровне города и выше.

[Harvesting geo-spatial data on coastal fish assemblages through coordinated citizen science](#)  
JG Støttrup, A Kokkalis, EJ Brown, J Olsen... - Fisheries Research, 2018

*In response to repeated complaints from recreational and commercial coastal fishermen about declining fishing opportunities in inner Danish waters, focus was directed to inshore [fish stocks](#). However, without data targeting inshore areas, it was not possible to investigate potential changes in fish distribution or abundances, or their causes. As a first step, a voluntary catch registration system was initiated in 2002, in collaboration with locally organized recreational fishermen. Using citizen science as a methodology, scientists and the fishermen developed a protocol for data collection, which the fishermen then implemented. After three years, during which time recreational fishermen could use their own gear and fish where they normally fished, the data was evaluated. As a result, the fishing method was switched in 2005 to fixed gears and fixed positions, to enable comparison between areas, years and season. The data from this project are now being used to create coastal fish indicators for managers to assess environmental status at a regional scale. Here we present an analysis of a subset of the data on one species, the European [flounder](#) (*Platichthys flesus*), to illustrate how the spatial and seasonal coverage can be utilized further for investigation of coastal ecosystems and to inform management.*

[\[PDF\] Is earth stewardship enhanced through citizen science projects and initiatives?](#)

JJ Tablada - 2018

*Overall, effectively performed citizen science projects, englobe a set of socio-transformative processes that can directly contribute to earth stewardship principles in a positive manner. From an individual level, such as personal growth and learning leading to pro-environmental behavior, to a more collective instance, such as influencing decision-making processes related to natural resources, this essay has tried to cover all of the ways citizen science can contribute to the enhancement of earth stewardship, the reasons why and the associated social relationships behind it.*

[Crowd-sourced pictures geo-localization method based on street view images and 3D reconstruction](#)

L Cheng, Y Yuan, N Xia, S Chen, Y Chen, K Yang... - ISPRS Journal of ..., 2018

*People are increasingly becoming accustomed to taking photos of everyday life in modern cities and uploading them on major photo-sharing social media sites. These sites contain numerous pictures, but some have incomplete or blurred location information. The geo-localization of crowd-sourced pictures enriches the information contained therein, and is applicable to activities such as urban construction, [urban landscape](#) analysis, and crime tracking. However, geo-localization faces huge technical challenges. This paper proposes a method for large-scale geo-localization of crowd-sourced pictures. Our approach uses structured, organized Street View images as a reference dataset and employs a three-step strategy of coarse geo-localization by image retrieval, selecting reliable matches by image registration, and fine geo-localization by 3D reconstruction to attach geographic tags to pictures from unidentified sources. The proposed method is not limited to small areas, and could be expanded to cities and larger areas owing to its flexible parameters.*

[\[PDF\] Optical sensing for stream flow observations: a review](#)

F Tauro, A Petroselli, S Grimaldi - Journal of Agricultural Engineering, 2018

*Images are revolutionizing the way we sense and characterize the environment by offering higher spatial and temporal coverage in ungauged environments at competitive costs. In this review, we illustrate the major image-based approaches that have been lately adopted within the hydrological research community. Although many among such methodologies have been developed some decades ago, recent efforts have been devoted to their transition from laboratories to operational outdoor settings. Sample applications of image-based techniques include flow discharge estimation in riverine environments, clogging dynamics in irrigation systems, and flow diagnostics in engineering infrastructures. The potential of such image-based approaches towards fully remote observations is also illustrated through a simple experiment with an unmanned aerial vehicle.*

[3D Georeferencing of Historical Photos by Volunteers](#)

T Produit, J Ingensand - ... Conference on Geographic Information Science, 2018

*Historical photographs are a very rich source of information that can be useful in a variety of different contexts such as environmental analyses, land planning and illustration of landscape evolution. However to reach this goal the images must be accurately georeferenced. In this paper we propose to use the crowd to perform the 3D georeferencing of collections of historical images. To this goal we implemented a web 3D georeferencer that offers volunteers the possibility to semi-automatically identify the location of the point from where a picture has been taken, the three angles: tilt, roll and yaw and the field of view. A virtual web-based globe is the central element in this tool that allows both for the georeferencing in three dimensions by volunteers and for the visualization of georeferenced images to assess the landscape variation through time.*

[\[HTML\] A Combined Approach to Classifying Land Surface Cover of Urban Domestic Gardens Using Citizen Science Data and High Resolution Image Analysis](#)

F Baker, CL Smith, G Cavan - Remote Sensing, 2018

*Domestic gardens are an important component of cities, contributing significantly to urban green infrastructure (GI) and its associated ecosystem services. However, domestic gardens are incredibly heterogeneous which presents challenges for quantifying their GI contribution and associated benefits for sustainable urban development. This study applies an innovative methodology that combines citizen science data with high resolution image analysis to create a garden dataset in the case study city of Manchester, UK. An online Citizen Science Survey (CSS) collected estimates of proportional coverage for 10 garden land surface types from 1031 city residents. High resolution image analysis was conducted to validate the CSS estimates, and to classify 7 land surface cover categories for all garden parcels in the city.*

[Crowd-Source Mapping of Geographic Information Resources by Volunteer Users of Mobile Devices for the Purpose of Emergency Responses](#)

MH Vahidnia, F Hosseinali, M Shafeie - *Journal of Geomatics Science and ...*, 2018

*After the first moments a crisis take place, quick emergency responses can be improved by updated spatial information and online map services of target places. Efficient use of GIS in the phase of response in crisis management requires having access to reliable data related to the crisis. Considering the critical situations at the initial moments of all disasters including earthquakes, floods, and accidents, as well as the great significance of geographic data in relief and providing the injured with appropriate care, the necessity of such data becomes apparent. The real time information acquired from crowdsourcing information can update the basic GIS server maps. Therefore, this study incorporates the capability of smart phone sensors, GPS, Web 2.0, VGI and Server-based technologies to design and develop a system for collecting target hazardous information from volunteers. Users can send information regarding the hazard location, its images, and other explanations to a central server through web technology and GPRS. This information and other crowdsourced information can be viewed by all users in real time through an updated map in the GIS Server. This online information can be used by relief groups so that they can hurry to the rescue of the injured with minimal loss of time. One of the most important contributions in designing this system is considering to the improvement of the positional accuracy of targets with respect to the position of the mobile device.*

[\[HTML\] Mapping Land Use Dynamics Using the Collective Power of the Crowd](#)

C Aubrecht, J Ungar, DO Aubrecht, S Freire... - *... Observation Open Science ...*, 2018

*Traditional land use and land cover (LULC) mapping has long relied strongly on input from Earth Observation (EO) data sources at various resolutions and scale levels. With high performance and cloud computing on the rise, rapid processing of large volumes of very high resolution (VHR) satellite imagery—big EO data—is becoming less problematic. Consequently, scientific challenges in that topical domain move on to the next level.*

[\[HTML\] The Changing Landscape of Geospatial Information Markets](#)

C O'Sullivan, N Wise, PP Mathieu - *Earth Observation Open Science and Innovation*, 2018

*We live in an increasingly global, connected and digital world. In less than a decade or so, fast developments in digital technologies, such as the Cloud, Internet, wireless network, and most importantly mobile telephony, have dramatically changed the way we work, live and play. Rapid advances in Information and Communication Technologies (ICT) foster a new world of cross-disciplinary data-intensive research characterised by openness, transparency, access to large volume of complex data, availability of community open tools, unprecedented level of computing power, and new collaboration among researchers and new actors such as citizen scientists. Identifying and understanding the key drivers of change in the data economy and EO sector (including technological, human, cultural and legal factors) is essential to providing context on which to build an EO strategy for the twenty-first century. The emergence of cloud computing is already transforming the way we access and exploit data. This has led to a paradigm shift in the way to distribute and process data, and in creating platforms that drive innovation and growth in user applications.*

[\[HTML\] Citizen Science for Observing and Understanding the Earth](#)

MM Haklay, S Mazumdar, J Wardlaw - *Earth Observation Open Science and ...*, 2018

*Citizen Science, or the participation of non-professional scientists in a scientific project, has a long history—in many ways, the modern scientific revolution is thanks to the effort of citizen scientists. Like science itself, citizen science is influenced by technological and societal advances, such as the rapid increase in levels of education during the latter part of the twentieth century, or the very recent growth of the bidirectional social web (Web 2.0), cloud services and smartphones. These transitions have ushered in, over the past decade, a rapid growth in the involvement of many millions of people in data collection and analysis of information as part of scientific projects. This chapter provides an overview of the field of citizen science and its contribution to the observation of the Earth, often not through remote sensing but a much closer relationship with the local environment. The chapter suggests that, together with remote Earth Observations, citizen science can play a critical role in understanding and addressing local and global challenges.*

[\[PDF\] Volunteered Geographic Information: A Review of the OpenStreetMap.org Project and Factors Relating to its Reliability](#)

S George - 2017

*In the field of Volunteered Geographic Information usage, understanding the historical background from which information came can be just as important as the content. This study reviews the development of the OpenStreetMap.org dataset and its potential to provide the most current information about a region following natural disasters. First, a review of the related studies into the use of this type of geographic information and description of the types and motivations of contributors is conducted. Second, contribution activity surrounding four major earthquake events and the community's response are reviewed. A process workflow is derived for comparing the spatial variance of OpenStreetMap.org data to that of a trusted dataset with the further goal of supporting the data's use in operations. A scenario is then used to test the workflow with the final output of cartographic products geared towards using OpenStreetMap.org data to prioritize data collection during ongoing operations.*

[\[PDF\] Participatory GIS in design of the Wrocław University of Science and Technology campus web map and spatial analysis of campus area quality](#)

J Blachowski, J Łuczak, P Zagrodnik - E3S Web of Conferences, 2018

*Public participation geographic information system (GIS) and participatory mapping data collection methods are means that enhance capacity in generating, managing, and communicating spatial information in various fields ranging from local planning to environmental management. In this study these methods have been used in two ways. The first one, to gather information on the additional functionality of campus web map expected by its potential users, i.e. students, staff and visitors, through web based survey. The second, to collect geographically referenced information on campus areas that are liked and disliked in a geo-survey carried out with ArcGIS Online GeoForm Application. The results of the first survey were used to map facilities such as: bicycle infrastructure, building entrances, wheelchair accessible infrastructure and benches. The results of the second one, to analyse the most and the least attractive parts of the campus with heat and hot spot analyses in GIS.*

[A Citizen Science Approach for Collecting Toponyms.](#)

AP Perdana, FO Ostermann - ISPRS International Journal of Geo-Information, 2018

*The emerging trends and technologies of surveying and mapping potentially enable local experts to contribute and share their local geographical knowledge of place names (toponyms). We can see the increasing numbers of toponyms in digital platforms, such as OpenStreetMap, Facebook Place Editor, Swarm Foursquare, and Google Local Guide. On the other hand, government agencies keep working to produce concise and complete gazetteers. Crowdsourced geographic information and citizen science approaches offer a new paradigm of toponym collection. This paper addresses issues in the advancing toponym practice. First, we systematically examined the current state of toponym collection and handling practice by multiple stakeholders, and we identified a recurring set of problems. Secondly, we developed a citizen science approach, based on a crowdsourcing level of participation, to collect toponyms. Thirdly, we examined the implementation in the context of an Indonesian case study. The lessons learnt include the knowledge that the success of this approach depends on the willingness of the government to advance their workflow, the degree of collaboration*

*between stakeholders, and the presence of a communicative approach in introducing and sharing toponym guidelines with the community.*

### Utilisation of crowdsourced geographic information for benefitting disaster response in New Zealand.

A Cunningham - 2018

*Crowdsourced Geographic Information (CGI) represents a new era in how we gather information, moving away from individual professionals to efforts involving the wider public regardless of qualification. CGI is of interest to both academics and spatial data users because it produces information at a rapid rate, and can be engaged to respond to events which require information from a changing environment. Naturally, this data is of considerable interest to disaster response agencies dealing with sudden events with a significant impact on known variables, such as where people live, or which infrastructure remains functional. At the time of writing, research in this field has been largely directed at overseas events, often in countries which have experienced events that completely overwhelmed their capacity for response. To this end, this study aims to fill that gap by focusing on crowdsourced research for New Zealand disaster response efforts, and investigates whether CGI can be beneficial here.*

## **Биология и экология**

Для области биологии и экологии существуют два хрестоматийных проекта. В течение многих лет они служат образцами для подражания. Первый проект - это Folding@Home. Это проект распределённых вычислений для проведения компьютерного моделирования свёртывания молекул белка. В течение многих лет это был крупнейший проект распределённых вычислений, как по мощности, так и по числу участников. Лишь в 2017 году Folding@Home уступил первое место Биткойну.

Второй проект это eBird. Объединяющий орнитологов-профессионалов и орнитологов-любителей проект eBird является одним из старейших масштабных краудсорсинговых проектов в области биологии. Последующие биологические и экологические проекты часто заимствовали идеологию и приемы этого классического орнитологического проекта.

Сегодня области биологических и экологических краудсорсинговых проектов разнообразны. Так, по оценкам новых публикаций, быстро растут в масштабах и в числе проекты массового участия в водоохроне. Обращено внимание на то, что широкий круг лиц, различных по возрасту и по степени заинтересованности, активно взаимодействуют с экспертами в области мониторинга качества воды и параметров водоснабжения. Прерогативой науки граждан является привязка измерений качества воды на местах к конкретной точке с помощью онлайн-приложений, GPS, ГИС, картографических платформ и социальных сетей.

Однако, в разделе имеются и работы, в которых указывается на ненадежность данных, поступающих от добровольцев-экологов, соответственно, упомянуты и провальные проекты (с разбором причин).

### Urban Raptor Communities: Why Some Raptors and Not Others Occupy Urban Environments

CW Boal - Urban Raptors: Ecology and Conservation of Birds of ..., 2018

*Although many raptors use urban areas in some seasons, quantitative data documenting seasonality and frequency of occurrence for many species is lacking. To explore raptor distribution and tendency toward using or avoiding urban areas, I compiled data available from the eBird website (<http://ebird.org/content/ebird/>). The eBird website is a citizen science program that allows participants to enter bird observations into a publically accessible online database. The program was initiated by the Cornell Lab of Ornithology and the National Audubon Society in 2002 and has grown to include more than 100,000 participants.*

### [Training tomorrow's conservation paleobiologists](#)

PH Kelley, GP Dietl, CC Visaggi - *Marine Conservation Paleobiology*, 2018

*Conservation paleobiology is committed to the mission of applying geohistorical records to the conservation and restoration of biodiversity and ecosystem services. Fulfilling this mission remains challenging because most conservation paleobiologists have not been trained to translate their science into management practice and policy. Ongoing discussion among conservation biologists provides lessons applicable to training tomorrow's conservation paleobiologists. We offer several recommendations for more effective training in conservation paleobiology. The approach we propose will better prepare tomorrow's conservation paleobiologists to function effectively in the conservation world.*

### [Listening to the Sounds of the Biosphere](#)

M Gross - 2018

*The sounds that living organisms make can help biologists to identify, track and study individuals and populations, but also to understand their interactions with their environment, which comes with its own tapestry of sound that may help or hinder the species. This realisation, along with technology enabling the analysis of complex sound mixtures, has produced a new field now known as soundscape ecology. One of its strengths is its ability to provide a simple assessment of how biotopes respond to environmental change.*

### [\[PDF\] Citizen Science and Wildlife Biology: Synergies and Challenges](#)

D Frigerio, P Pipek, S Kimmig, S Winter, J Melzheimer... - *Ethology*, 2018

*Citizen science (CS) has evolved over the past decades as a working method involving interested citizens in scientific research, for example by reporting observations, taking measurements or analysing data. In the past, research on animal behaviour has been benefitting from contributions of citizen scientists mainly in the field of ornithology but the full potential of CS in ecological and behavioural sciences is surely still untapped. Here, we present case studies that successfully applied CS to research projects in wildlife biology and discuss potentials and challenges experienced. Our case studies cover a broad range of opportunities: largescale CS projects with interactive online tools on bird song dialects, engagement of stakeholders as citizen scientists to reduce human-wildlife conflicts, involvement of students of primary and secondary schools in CS projects as well as collaboration with the media leading to successful recruitment of citizen scientists. We further show how specific training for the participants may be needed to obtain reliable data. We consider CS as a suitable tool to enhance research in wildlife biology through the application of open science procedures (i.e., open access to articles and the data on publicly available repositories) to support transparency and sharing experiences.*

### [Intellectual Property and Clean Energy: The Paris Agreement and Climate Justice](#)

M Rimmer - 2018

*This collection considers the future of climate innovation after the Paris Agreement. It analyses the debate over intellectual property and climate change in a range of forums – including the climate talks, the World Trade Organization, and the World Intellectual Property Organization, as well as multilateral institutions dealing with food, health, and biodiversity. The book investigates the critical role patent law plays in providing incentives for renewable energy and access to critical inventions for the greater public good, as well as plant breeders' rights and their impact upon food security and climate change. Also considered is how access to genetic resources raises questions about biodiversity and climate change. This collection also explores the significant impact of trademark law in terms of green trademarks, eco labels, and greenwashing. The key role played by copyright law in respect of access to environmental information is also considered. The book also looks at deadlocks in the debate over intellectual property and climate change, and provides theoretical, policy, and practical solutions to overcome such impasses.*

[\[PDF\] Caterpillars Count! A Citizen Science Project for Monitoring Foliage Arthropod Abundance and Phenology](#)

AH Hurlbert, TE Hayes, TN McKinnon, CL Goforth - bioRxiv, 2018

*Citizen science programs are one of the most effective ways to monitor simple biological phenomena like phenology over broad geographic extents as demonstrated by the recent efforts by the National Phenology Network or Project Budburst. Individual scientists or research groups are simply unable to collect data efficiently at the relevant spatial and temporal scales for addressing these broad biogeographical questions. Here we introduce a new citizen science project, Caterpillars Count! (<http://caterpillarscount.unc.edu>), whose aim is to document geographic and annual variation in the phenology and abundance of arthropods that foliage gleaning birds rely on during the breeding season.*

[Who's "Hooting"? Motivations and Scientific Attitudes of Manitoban Citizen Science Owl Surveyors](#)

C Ng, J Duncan, N Koper - Avian Conservation and Ecology, 2018

*Citizen science is gaining popularity as a means for all persons to participate in and contribute to scientific projects, and can increase our understanding of avian conservation and ecology by facilitating the collection of more data. Understanding the type of person who participates in citizen science projects, including their motivations, behaviors, and gains, allows researchers to better recruit and retain participants and to design enjoyable and educational projects with direct and indirect benefits to conservation and science. We surveyed participants of the Manitoba Nocturnal Owl Survey, an ongoing 25-year-old citizen science project, to evaluate how and why people participated and to determine their relationship with science and ecology. The interpersonal dimensions of surveying was important at all stages of participation, affecting recruitment, participation, and reasons for leaving. Marketing citizen science projects as social learning opportunities embedded in nature may help attract and retain more volunteers, ensuring long-term sustainability of programs while engaging new participants in activities that increase their ecological knowledge and awareness.*

[Biodiversity, the Tree of Life, and Science Communication](#)

J Rosindell, Y Wong - Phylogenetic Diversity, 2018

*The usual approach to organising human knowledge in any field is to invent an intuitive, often hierarchical system of classification. Perhaps uniquely to natural history, humans did not so much invent such a system as discover one: the tree of life. This now iconic object has utility, not only in biodiversity research but also in conservation and science communication. For example, engagement in conservation requires highlighting the scale of biodiversity and what we stand to lose; this can be communicated very effectively by showing people the complete tree of life. Here we discuss the challenges involved in making the complete tree of life accessible to a broad audience. The first challenge relates to data curation, which is marred by the lack of a universally recognised database of species names. Different species can have the same name, different names can refer to the same species, and spelling errors are rife. The second challenge is tree visualisation. While many visualisation methods already exist, few are able to represent the complete tree of life.*

[Developing Mobile Applications for Environmental and Biodiversity Citizen Science: Considerations and Recommendations](#)

S Luna, M Gold, A Albert, L Ceccaroni, B Claramunt... - Multimedia Tools and ..., 2018

*The functionality available on modern 'smartphone' mobile devices, along with mobile application software and access to the mobile web, have opened up a wide range of ways for volunteers to participate in environmental and biodiversity research by contributing wildlife and environmental observations, geospatial information, and other context-specific and time-bound data. This has brought about an increasing number of mobile phone based citizen science projects that are designed to access these device features (such as the camera, the microphone, and GPS location data), as well as to reach different user groups, over different project durations, and with different aims and goals. In this chapter we outline a number of key considerations when designing and developing mobile applications for citizen science, with regard to (1) Interoperability. The factors that*

influence the usability of the mobile application are covered in both (2) Participant Centred Design and Agile Development, and (3) User Interface and Experience Design. Finally, the factors that influence sustained engagement in the project are covered in (4) Motivational Factors for Participation.

### [Understanding the Relationship Between Volunteers' Motivations and Learning Outcomes of Citizen Science in Rice Ecosystems in the Northern Philippines](#)

ES Dem, B Rodríguez-Labajos, M Wiemers, J Ott... - Paddy and Water ..., 2018

*This study relies on the Flying Beauties Citizen Science project conducted in the Philippines to assess personal motivations and learning outcomes of volunteers who were involved in documenting butterflies and dragonflies in rice ecosystems. While evaluation of motivations of volunteers in Citizen Science is not new, at least in affluent western countries, little is done in investigating volunteers' motivations and learning outcomes of Citizen Science projects in low-income countries. Using surveys, we collected data from volunteers that were analysed qualitatively and quantitatively. We adopted a two stages evaluation format—before and after volunteers finished the project exercise. We compared pre-motivations to motivations attained and changes in level of knowledge before and after the project ended. We use Spearman's Rho, Kendall's Tau—nonparametric tests to draw correlations between variables. The results showed that key determinants that drove people to volunteer in the project were (a) learning about species and (b) being part of scientific research and the principal learning outcome was improved awareness about ecosystem functions of the species.*

### [Flight Lines: Tracking the Wonders of Bird Migration](#)

SE Mabey - 2018

*At a time of continued declines in biodiversity and increased alienation from the natural world, a hopeful love of birds somehow persists. Within the United States and across Europe, birdwatching remains a popular pastime. More than 45 million Americans watch birds, making this the single most popular wildlife activity in the United States. In the United Kingdom, a strong tradition of birding is being kept alive by an increasing number of millennials. A passion for birds is an expression of a broader affinity for nature and presents an opportunity to connect birdwatchers with science, conservation practice, and policy. Flight Lines is the result of an ambitious collaboration between the British Trust for Ornithology (BTO) and the Society of Wildlife Artists (SWLA) to relate the complex lives of Britain's beloved migratory birds.*

### [\[HTML\] The Threefold Potential of Environmental Citizen Science-Generating Knowledge, Creating Learning Opportunities and Enabling Civic Participation](#)

T Turrini, D Dörler, A Richter, F Heigl, A Bonn - Biological Conservation, 2018

*Citizen science offers significant innovation potential in science, society and policy. To foster environmental and conservation goals, citizen science can (i) generate new knowledge, (ii) enhance awareness raising and facilitate in-depth learning as well as (iii) enable civic participation. Here, we investigate how these aims are realised in citizen science projects and assess needs and challenges for advancing citizen science and stimulating future initiatives. Our findings show that citizen science project managers pursue goals related to all three areas of potential impact. Interestingly, enabling civic participation was considered slightly less important in relation to generating new knowledge and creating learning opportunities. Different areas of necessary action emerge from our analysis. To fully realize the potential of citizen science for generating knowledge, priority should be given to enhance capacities to more effectively share research results with the scientific community through publication, also in scientific journals. Systematic evaluation is needed to gain a better understanding of citizen science learning outcomes, for which criteria need to be developed. Fostering project formats that allow participants to get involved in the whole research process – from posing the study question to implementing results – could enhance the transformative aspect of citizen science at a societal level. Important structural aspects that need to be addressed include adjustments in funding schemes, facilitation of communication between citizens and academia-based scientists, and offers for training, guidance and networking.*

[\[HTML\] Cross-species referential signalling events in domestic dogs \(\*Canis familiaris\*\)](#)

HK Worsley, SJ O'Hara - *Animal Cognition*, 2018

*Referential gestures are used by a signaller to draw a recipient's attention to a specific object, individual or event in the environment. These gestures have received much research attention in relation to human and non-human primates with great apes being shown to possess impressive gestural repertoires. Domestic dogs (*Canis familiaris*) meanwhile provide an ideal non-primate candidate for investigating referential signalling due to their unique relationship with humans that centres on non-verbal communication with frequent interaction. Here we observed 37 pet dogs in their own homes. Owners recorded 242 videos containing 47 potential referential gesture events. We analysed those recordings to reveal evidence of 19 referential gestures performed by domestic dogs during everyday communicative bouts with humans, showing that the gestures conform to the five features of referential signalling. Our study exposes impressive gesturing abilities in a non-primate mammal; especially when viewed in the context of the cross-species rather than intraspecific communication.*

[\[HTML\] Three new species of \*Grouvellinus\* Champion, 1923 from Maliau Basin, Sabah, Borneo, discovered by citizen scientists during the first Taxon Expedition \(\*Insecta ...\*](#)

H Freitag, CV Pangantihon, I Njunjić - *ZooKeys*, 2018

*Further results are presented of the first field course at Maliau Basin, Malaysian Borneo organized by Taxon Expeditions, an organization which enables citizen scientists to be directly involved in taxonomic discoveries. Three new species of the aquatic beetle were collected jointly by the citizen scientists and taxonomists during the fieldwork in Maliau Basin. Material was mainly sampled from sandstone bottom rocks of blackwater streams at altitudes between 900 m and 1,000 m using fine-meshed hand-nets. The beetle is widely distributed in the Oriental and Palearctic regions, but these are the first records from the island of Borneo.*

[\[PDF\] Explaining European Fungal Fruiting Phenology with Climate Variability](#)

C Andrew, E Heegaard, K Høiland, B Senn... - *Ecology*, 2018

*Here we assess the impact of geographically dependent (latitude, longitude, and altitude) changes in bioclimatic (temperature, precipitation, and primary productivity) variability on fungal fruiting phenology across Europe. Two main nutritional guilds of fungi, saprotrophic and ectomycorrhizal, were further separated into spring and autumn fruiters. We used a path analysis to investigate how biogeographic patterns in fungal fruiting phenology coincided with seasonal changes in climate and primary production. Across central to northern Europe, mean fruiting varied by approximately 25 d, primarily with latitude. Altitude affected fruiting by up to 30 d, with spring delays and autumnal accelerations. Fruiting was as much explained by the effects of bioclimatic variability as by their large-scale spatial patterns. Temperature drove fruiting of autumnal ectomycorrhizal and saprotrophic groups as well as spring saprotrophic groups, while primary production and precipitation were major drivers for spring fruiting ectomycorrhizal fungi.*

[Floral morphology as the main driver of flower-feeding insect occurrences in the Paris region](#)

J Desaeagher, S Nadot, C Fontaine, B Colas - *Urban Ecosystems*, 2018

*Through the rapid expansion worldwide of impervious areas and habitat fragmentation, urbanization has strong consequences that must be understood to efficiently manage biodiversity. We studied the effects of urbanization on flower-feeding insects by using data from a citizen science program in the Parisian region. We analysed the occurrence of insects from 46 different families on flowers of different morphologies, using landscape indices in buffer areas from a 100-m to a 4000-m radius around 1194 sampled sites. Our aims were to determine (i) how the proportion of impervious area around sampled sites affected the occurrence of flower-feeding insect families and at which landscape scales impervious area calculations best predicted these occurrences; (ii) the effect of corolla shape variables on insect family occurrences. The results suggest that flora management might be a key component for the conservation of insect diversity in cities.*

## [Carrot Juice Fermentations as Man-Made Microbial Ecosystems Dominated by Lactic Acid Bacteria](#)

S Wuyts, W Van Beeck, EFM Oerlemans, S Wittouck... - *Applied and Environmental ...*, 2018

*Spontaneous vegetable fermentations, with their rich flavors and postulated health benefits, are regaining popularity. However, their microbiology is still poorly understood, therefore raising concerns about food safety. In addition, such spontaneous fermentations form interesting cases of man-made microbial ecosystems. Here, samples from 38 carrot juice fermentations were collected through a citizen science initiative, in addition to three laboratory fermentations. Culturing showed that Enterobacteriaceae were outcompeted by lactic acid bacteria (LAB) between 3 and 13 days of fermentation. Metabolite-target analysis showed that lactic acid and mannitol were highly produced, as well as the biogenic amine cadaverine.*

## [Mammalwatching: A New Source Of Support for Science and Conservation](#)

V Dinets, J Hall - *International Journal of Biodiversity and Conservation*, 2018

*During the 20th century, birding evolved from a little-known hobby into a global phenomenon important for ornithology and bird conservation. More recently a similar change has begun for mammalwatching, which is rapidly gaining popularity and is already providing financial support, observational data, diagnostic information, and a volunteer base for mammalogy and mammalian conservation. The study data suggest that mammalwatching has the potential to end decades of neglect of small mammals in dire need of conservation, to improve our knowledge of mammalian status and distribution, and to increase public support for conservation measures, especially for species not seen as particularly charismatic by the general public. Professional mammalogists and conservation workers can benefit from this new trend, but they can also help it. We offer a number of suggestions as to how professionals mammalogists and the amateur community can better work together to promote conservation and science.*

## [Citizen Science and Climate Change: Mapping the Range Expansions of Native and Exotic Plants with the Mobile App Leafsnap](#)

WJ Kress, C Garcia-Robledo, JVB Soares, D Jacobs... - *BioScience*, 2018

*The mobile iPhone app Leafsnap, designed for the automatic identification of 220 tree species from the northeastern United States, was released to the public in 2011. In the first 3 years of its use, the app was downloaded by more than 1,500,000 users from five continents and 181 countries who recorded over 3,056,684 leaf images. The high levels of accuracy of Leafsnap identifications, as were confirmed by expert botanists, were used to map the geographic distribution of native and exotic species at a scale previously unachievable without this technology and without the aid of citizen scientists. Species demonstrated northerly migrations, southerly migrations, or little change from their estimated distributions in the 1950s. These results suggest that this tool carried on the phones of millions may potentially collect invaluable data that can be used to monitor the effects of climate change and exotic species on tree distributions at broad geographic scales.*

## [\[HTML\] A Call to Document Female Bird Songs: Applications for Diverse Fields](#)

KJ Odom, L Benedict - *The Auk*, 2018

*Research on bird song has contributed to important advances in diverse biological fields from neurobiology to conservation biology. Bird song has traditionally been studied as an elaborate male trait, but female song is also widespread in both temperate and tropical species and likely evolved in the early ancestors of modern songbirds. However, female song is underrepresented in biological collections compared to male song, and we lack documentation of female songs for most songbird species. Better documentation of female bird song is necessary for an understanding of the prevalence, regulation, function, evolution, and conservation applications of avian vocalizations. Therefore, we call on all researchers to disseminate their observations of female bird song, and to spread the word among other researchers, students, field technicians, and citizen scientists that many female songbirds sing. To this end, we provide resources for disseminating recordings and written documentation of female song, including best practices for*

documentation, venues for archiving and publishing, and our citizen science project, the Female Bird Song Project.

### [Birds, Binoculars, and Biodiversity](#)

J Nugent - Science Scope, 2018

Count feathered friends this February 16–19, 2018, as part of the annual Great Backyard Bird Count (GBBC)! The global GBBC citizen science event is not limited to backyard bird counting—in fact, you can count birds from a park, your schoolyard, and anywhere else birds are found. The global event began nearly two decades ago and is a joint project of the Cornell Lab of Ornithology, the National Audubon Society, and Bird Studies Canada, designed to provide an annual snapshot of bird abundance and biodiversity worldwide (see Figures 1–3). Participating in the GBBC is easy—you will count birds for 15 minutes (or longer) on one or more days of the GBBC event.

### [\[HTML\] The Value of Citizen Science for Ecological Monitoring of Mammals](#)

AW Parsons, C Goforth, R Costello, R Kays - PeerJ, 2018

Citizen science approaches are of great interest for their potential to efficiently and sustainably monitor wildlife populations on both public and private lands. Here we present two studies that worked with volunteers to set camera traps for ecological surveys. The photographs recorded by these citizen scientists were archived and verified using the eMammal software platform, providing a professional grade, vouchered database of biodiversity records. We found similar levels of bear activity inside and outside the NHS, and regional comparisons suggest the bear population is typical. Participants benefited from knowing their local bear population was normal and managers refocused bear management given this new information. Our second example is a continuous survey of wildlife using the grounds of a nature education center that actively manages habitat to maintain a grassland prairie. Center staff incorporated the camera traps into educational programs, involving visitors with camera setup and picture review. Over two years and 5,968 camera-nights this survey has collected 41,393 detections of 14 wildlife species. Detection rates and occupancy were higher in open habitats compared to forest, suggesting that the maintenance of prairie habitat is beneficial to some species. Over 500 volunteers of all ages participated in this project over two years. Some of the greatest benefits have been to high school students, exemplified by a student with autism who increased his communication and comfort level with others through field work with the cameras. These examples show how, with the right tools, training and survey design protocols, citizen science can be used to answer a variety of applied management questions while connecting participants with their secretive mammal neighbors.

### [African Wild Dog Habitat Use Modelling Using Telemetry Data and Citizen Scientist Sightings: are the Results Comparable?](#)

T Shumba, RA Montgomery, GSA Rasmussen... - African Journal of Wildlife ..., 2018

Quantifying landscape characteristics that wildlife select is essential for conservation and management action. Models that map wildlife resource selection tend to be informed by telemetry technology which is costly to acquire/maintain and potentially risky to deploy. Therefore, there is value in pursuing alternative data collection protocols, such as citizen scientist approaches to ascertain whether they can reveal results comparable to those derived from telemetry studies. The conservation of African wild dogs (*Lycaon pictus*) presents an interesting case study to examine this topic. The species is rare and wide-ranging, hence data collection is both challenging and costly. They are, however, a group-living species with unique and conspicuous coat markings, making them potentially well-suited to citizen science data collection strategies. Here, we fitted resource selection functions (RSFs) built from Global Position System (GPS) telemetry data, and from citizen scientist data, collected in and around Hwange National Park, Zimbabwe. Our analysis demonstrates that sufficient citizen science data can be a valuable alternative to telemetry data for African wild dogs. We thus encourage the collection and use of citizen science data for similar analyses, particularly when funding is limited. Our work also highlights areas in and around Hwange National Park with the highest probability of being used by African wild dogs, which is where conservation efforts should be intensified.

[On the Ecological Significance of Pollen Color: a Case Study in American Trout Lily \(\*Erythronium americanum\*\). DATA ARCHIVE](#)

E Austen, SY Lin, J Forrest - 2018

*Evolutionary ecologists seek to explain the processes that maintain variation within populations. In plants, petal color variation can affect pollinator visitation, environmental tolerance, and herbivore deterrence. Variation in sexual organs may similarly affect plant performance. Within-population variation in pollen color, as occurs in the eastern North American spring ephemeral *Erythronium americanum*, provides an excellent opportunity to investigate the maintenance of variation in this trait. Although the red/yellow pollen-color polymorphism of *E. americanum* is widely recognized, it has been poorly documented. Our goals were thus (1) to determine the geographic distribution of the color morphs, and (2) to test the effects of pollen color on components of pollen performance. Data provided by citizen scientists indicated that populations range from monomorphic red, to polymorphic, to monomorphic yellow, but there was no detectable geographic pattern in morph distribution, suggesting morph occurrence cannot be explained by a broad-scale ecological cline.*

[Robot-Scientists Will Lead Tomorrow's Biomaterials Discovery](#)

A Vasilevich, J de Boer - Current Opinion in Biomedical Engineering, 2018

***Biomaterials** engineering is tightly linked with progress in its underlying sciences and technologies, such as biology, chemistry, physics, and engineering. Current establishment of [high throughput screening](#) platforms has warranted the need for data analysis as part of biomaterials engineering. We believe that current advancement in artificial intelligence, miniaturization of materials fabrication and application of robotics will eventually lead to the emergence of autonomous, intelligent systems able to perform biomaterials research on their own. In this manuscript, we describe the state of the art in the triangle of material engineering, biology, and data science, and sketch their integration to yield the biomaterials conveyor belt of tomorrow.*

[Mobile Learning in Environmental Citizen Science: An Initial Survey of Current Practice in Germany](#)

U Sturm, A Moormann, A Faber - it-Information Technology, 2018

*Citizen science is a growing approach in science and the opportunities of new technologies and learning are considered more and more. We give an overview of the current practice of mobile learning in Germany by conducting an explorative survey among environmental citizen science projects using mobile apps. This study supports the idea that education is relevant in citizen science, and apps affect the learning experience of participants. However, several obstacles were identified that need to be considered, to be able to fully exploit the benefits of mobile learning in citizen science.*

[The Contribution of Digital Sociology to the Investigation of Air Pollution](#)

L Lombi - Clinical Handbook of Air Pollution-Related Diseases, 2018

*Air pollution and its implications for quality of life and human health are important issues in industrialised and urbanised countries. In recent years, there has been an increase in interest in alternative and supplementary air quality analysis methods which utilise techniques involving technologies developed during the Internet 2.0. In particular, the spread of mobile devices and the social media have contributed to the emergence of the new approaches discussed in this paper: people as sensors, citizen science and collective sensing. People as sensors refers to the involvement of humans in the measurement phenomena and collection of data through mobile devices when used as sensing instruments. Citizen science is a form of participatory sensing based on projects which enable citizens to act as agents of change. Collective sensing is based on new research techniques which analyse the user-generated content published through social media platforms to explore concerns, opinions, alert messages, reactive behaviour and other aspects of human life. The common denominator of these approaches is the engagement of citizen as prosumer.*

## Dynamics of Plastic Resin Pellets Deposition on a Microtidal Sandy Beach: Informative Variables and Potential Integration into Sandy Beach Studies

L Fanini, F Bozzeda - *Ecological Indicators*, 2018

*The study addressed temporal dynamics of plastic resin pellets input on a Mediterranean beach, paired with standard environmental variables known to be relevant to sandy beach ecology. Time-related component of the study were related to two levels: 1) weekly sampling along one year, and 2) allocation of beached pellets to categories "old" and "new" as proxy of the time spent in the environment. Pellets were collected by sieving along a fixed transect perpendicular to the shoreline. In correspondence of each sampling were measured beach width and beach face slope. Results hence point to plastic resin pellets as a pressure impact, rather than a spill-related, time-limited one. A list of simple and cost-effective measurements of sandy beach features is provided as a guidance to couple basic ecological information with a possible range of research (including citizen science) addressing beached anthropogenic litter-including plastic pellets. This would ideally enhance the relevance of both research on beached plastics and sandy beach biota, so far running along parallel paths.*

## [PDF] A Comparison of Ground-Based Methods for Estimating Canopy Closure for Use in Phenology Research

AM Smith, PM Ramsay - *Agricultural and Forest Meteorology*, 2018

*Climate change is influencing tree [phenology](#), causing earlier and more prolonged canopy closure in [temperate forests](#). Canopy closure is closely associated with understorey light, so shifts in its timing have wide-reaching consequences for ecological processes in the understorey. Smartphone photography with an inexpensive fisheye lens attachment proved the most reliable estimator of canopy closure. We found no significant difference in canopy estimations from three widely-owned smartphone models with differing resolutions and fields of view, and no significant effect of camera operator on the results. ImageJ, a free image analysis software, detected canopy variability in a similar way to HemiView specialist hemispherical photography software. We recommend a combination of smartphone photography with fisheye attachment and analysis with ImageJ for identifying changes in the timing of canopy closure (but not for estimating absolute canopy closure). We discuss how large-scale citizen science using this approach could generate meaningful and comparative data on the timings of canopy closure in different forests, year-to-year.*

## Insect Conservation Psychology

JP Simaika, MJ Samways - *Journal of Insect Conservation*, 2018

*People seek connectedness with nature, as evidenced by 8 billion people per year visiting terrestrial parks alone. Yet the challenge is for people to appreciate and care for nature, including insects, on which we so crucially depend for so many services. Current environmental policy is often a dichotomy of mutually exclusive opposites: instrumental valuation vs. intrinsic valuation. This unhelpful division can be overcome by valuing nature through appreciation of spatial extent (local to global) relative to biological level (gene through population and species, to ecosystem) and understanding that human well-being is a two-way process of caring for nature - nature providing a well-being platform for us. However, human relationships with nature are complex, as they are with insects too. To improve insect conservation awareness and action, we need to engage insect conservation psychology. Citizen science and Red Listing are playing major roles here, as is the camera, which magnifies and makes insects more meaningful to us. Using insect conservation psychology, we are better able to instill a culture of personal and social responsibility, and so create political will to drive insect conservation from paper to action.*

## Understanding and Planning for the Environmental Benefits of Community Engagement Programs

A Kusmanoff, G Garrard, S Jackson, S Bekessy - 2017

*While some environmental benefits of environmental engagement programs have been well studied (e.g. reduction in consumption of energy, water, etc.), the specific biodiversity benefits of environmental engagement are less well understood, particularly those associated with attempts to*

*promote pro-environmental behaviour change. This review provides a summary of current knowledge about the key approaches to environmental engagement, the means by which this engagement can lead to biodiversity benefits, and options for evaluating the biodiversity benefits of environmental engagement programs. We begin by providing an outline of the way in which engagement programs can deliver environmental benefits, and then provide an overview of the different approaches to environmental engagement, including how they are believed to promote Environmental Engagement Direct benefits to biodiversity through activities such as: planting, weed control, mapping, monitoring. We then outline the ways in which behaviours can be measured or inferred as a proxy for environmental benefits.*

### [A Role for Artificial Night-Time Lighting in Long-Term Changes in Populations of 100 Widespread Macro-Moths in UK And Ireland: A Citizen-Science Study](#)

JF Wilson, D Baker, J Cheney, M Cook, M Ellis... - Journal of Insect ..., 2018

*The abundance of 100 of the most widespread species of macro-moth in the UK and Ireland was estimated from light-trap records reported to the UK and Ireland Garden Moth Scheme between 2005 and 2015. Recording sites were classified into low, medium and high night-time illumination categories by satellite imagery, into land-use types from the dominant use in the 1–2 km surrounding area, and by latitude. Most urban sites were in the group classified as having high night-time illumination. Comparison between medium and low night-time illuminated sites allowed differences between levels of illumination free from the effect of urbanization on moth abundance to be assessed. The medium and low night-time illuminated sites differed significantly in the frequency of grassland and arable land-use types and in geographic location with more grassland and north-western sites in the low-light category. This is the first demonstration that artificial night-time lighting has had, in combination with other factors, a significant influence on levels of abundance of moth populations.*

### [Cultivating Community Interactions in Citizen Science: Connecting People to Each Other and the Environment](#)

BA Finley - 2017

*Citizen science leverages a distributed user-base which participates in crowd-sourced scientific inquiry. Geotagger is a citizen science project that allows people to collaboratively investigate the natural world around them and share their findings. Citizens are rarely compensated for their work and individual contributors can feel isolated which leads to motivation problems. This thesis focuses on engaging citizen scientists and motivating their contributions via social interaction and engagement. As a part of this work, a number of social enhancements have been developed as extensions to the existing Geotagger project. These enhancements and their effect on social engagement were evaluated using in-field studies and design investigations with children. In the studies, children engaged effectively with each other using the social enhancements in Geotagger, and showed a preference for the application that included these social enhancements.*

### [The Contribution of Digital Sociology to the Investigation of Air Pollution](#)

L Lombi - Clinical Handbook of Air Pollution-Related Diseases, 2018

*Air pollution and its implications for quality of life and human health are important issues in industrialised and urbanised countries. In recent years, there has been an increase in interest in alternative and supplementary air quality analysis methods which utilise techniques involving technologies developed during the Internet 2.0. In particular, the spread of mobile devices and the social media have contributed to the emergence of the new approaches discussed in this paper: people as sensors, citizen science and collective sensing. People as sensors refers to the involvement of humans in the measurement phenomena and collection of data through mobile devices when used as sensing instruments. Citizen science is a form of participatory sensing based on projects which enable citizens to act as agents of change. Collective sensing is based on new research techniques which analyse the user-generated content published through social media platforms to explore concerns, opinions, alert messages, reactive behaviour and other aspects of human life.*

[HTML] [Contrasting the Views and Actions of Data Collectors and Data Consumers in a Volunteer Water Quality Monitoring Project: Implications for Project Design and ...](#)

C Cooper, L Larson, KK Holland, R Gibson, D Farnham... - *Citizen Science: Theory and ...*, 2017

*Data collection or generation is the primary way that the majority of volunteers advance the scientific goals of citizen science projects, but other activities such as data consumption also may influence learning, civic, and conservation outcomes. Project designers and managers balance goals for multiple outcomes and thus need to consider the influence of all project-related activities on outcomes. In a study of the kayak-based Citizen's Water Quality Testing (CWQT) Program in New York City, we compared the characteristics, perceptions, and behaviors of those collecting and using CWQT data (data collectors) and those solely using the data (data consumers). Data collectors and consumers had similar motivations for participation, except that collectors were more likely motivated by recognition for their efforts. We synthesize and expand current conceptual frameworks of citizen science participation and outcomes, highlighting the need for further study to understand mechanisms and linkages between the varied activities of citizen science projects and broader social and ecological impacts. To achieve conservation goals, project managers should broaden the definition of participant to include those carrying out activities other than data collection (such as data use) and explicitly manage for potential benefits derived by consumers of citizen science.*

[Sampling of Micro \(Nano\) Plastics In Environmental Compartments: How to Define Standard Procedures?](#)

MF Costa, JP da Costa, AC Duarte - *Current Opinion in Environmental Science & ...*, 2018

*Microplastics, plastic particles smaller than <5 mm, are a worldwide environmental concern and the current realisation of the scale of the problem made the quest for methodological consensus in sampling, sample treatment, data handling, and reporting central to the scientific community. The need for spatio-temporal comparisons and multiple-scale surveys have pressed the development and sharing of methods and techniques. Determining the amounts of microplastics at sea, variation patterns and ongoing [ecological processes](#) are objectives of studies with effect on society and [environmental management](#). The rising issue of microplastics in food and their possible role in the register, description, and quantification of anthropogenic interference in the environment opens a new philosophical and working front for science, decision makers, and citizens alike.*

[Quantifying Ecosystem Service Flows at Multiple Scales Across the Range of a Long-Distance Migratory Species](#)

DJ Semmens, JE Diffendorfer, KJ Bagstad... - *Ecosystem Services*, 2018

*Migratory species provide ecosystem goods and services throughout their annual cycles, often over long distances. Designing effective conservation solutions for migratory species requires knowledge of both species ecology and the socioeconomic context of their migrations. We present a framework built around the concept that migratory species act as carriers, delivering benefit flows to people throughout their annual cycle that are supported by the network of ecosystems upon which the species depend. We apply this framework to the monarch butterfly (*Danaus plexippus*) migration of eastern North America by calculating their spatial subsidies. Spatial subsidies are the net ecosystem service flows throughout a species' range and a quantitative measure of the spatial mismatch between the locations where people receive most benefits and the locations of habitats that most support the species. Results indicate cultural benefits provided by monarchs in the U.S. and Canada are subsidized by migration and overwintering habitat in Mexico. At a finer scale, throughout the monarch range, habitat in rural landscapes subsidizes urban residents. Understanding the spatial distribution of benefits derived from and ecological support provided to monarchs and other migratory species offers a promising means of understanding the costs and benefits associated with conservation across jurisdictional borders.*

[HTML] [Practical Solutions for Bottlenecks in Ecosystem Services Mapping](#)  
I Palomo, L Willemen, E Drakou, B Burkhard... - *One Ecosystem*, 2018

*Ecosystem services (ES) mapping is becoming mainstream in many sustainability assessments, but its impact on real world decision-making is still limited. Robustness, end-user relevance and transparency have been identified as key attributes needed for effective ES mapping. However, these requirements are not always met due to multiple challenges, referred to here as bottlenecks, that scientists, practitioners, policy makers and users from other public and private sectors encounter along the mapping process.*

[HTML] [Geo-Referencing Bird-Window Collisions for Targeted Mitigation](#)  
RS Winton, N Ocampo-Peñuela, N Cagle - *PeerJ*, 2018

*Bird collisions with windows are an important conservation concern. Efficient mitigation efforts should prioritize retrofitting sections of glass exhibiting the highest mortality of birds. Most collision studies, however, record location meta-data at a spatial scale too coarse (i.e., compass direction of facing facade) to be useful for large buildings with complex geometries. Through spatial analysis of three seasons of survey data at a large building at a university campus, we found that GPS data were able to identify collision hotspots while compass directions could not. To demonstrate the broad applicability and utility of this georeferencing approach, we identified collision hotspots at two additional urban areas in North America. The data for this latter exercise were collected via the citizen science database, iNaturalist, which we review for its potential to generate the georeferenced data necessary for directing building retrofits and mitigating a major source of anthropogenic bird mortality.*

[Anthropogenic Sources of Non-Migratory Avian Mortalities in Singapore](#)  
JX David, DL YONG, BW LOW, A OWYONG, C Alfred - *The International Journal of ...*, 2018

*Although urban spaces are increasingly recognised as viable habitats for wildlife, cities remain a major source of anthropogenic mortality for wild birds. While the sources of urban avian mortalities have been well documented in North America, these phenomena remain poorly studied in Southeast Asia, especially for resident species. Here we present the first summary of non-migratory urban bird mortalities for the heavily urbanised island of Singapore. We conducted a citizen science study using print and social media outreach to encourage members of the public to report their observations of dead birds between November 2013 and October 2017, and collected a total of 362 mortality records across 65 resident bird species and five mortality sources. Our results show that a diverse array of bird species is directly impacted by anthropogenic sources of mortality, although mortalities stemming from roadkill and cat predation are likely to be undersampled.*

[HTML] [Using Occupancy Modeling to Monitor Dates of Peak Vocal Activity for Passerines in California](#)  
BJ Furnas, MC McGrann - *The Condor*, 2018

*Advancement in timing of important life history events for birds due to climate change presents conservation and monitoring challenges. Song and other vocal activity are strong indicators of avian phenology because they correspond to territorial defense and mate attraction during the breeding season. We combined data from 2 projects using point counts and automated sound recorders to survey passerines during the breeding season in northern California, USA (553 sites, 2009–2011). We used multi-species occupancy modeling to estimate how detection probability based on vocalizations varied over the course of the breeding season. We estimated dates of peak vocal activity, which we reasoned were indicative of reproductive phenology. Monitoring vocal phenology of birds through occupancy modeling of survey data from the breeding season is an efficient approach to assessing climate change impacts because species occupancies and measures of community-level diversity can be simultaneously estimated.*

[The Status of Cinereous Vulture \*Aegypius monachus\* on Jeju Island for 15 years](#)

KE Mi, KC Wan, JC Hyun, KH Man - 한국조류학회지, 2017

*The Cinereous Vulture is the endangered species which is usually found in Europe and Asia. We need to collect various information because the change of inhabited environment affected negatively this bird. We conducted this survey, using the citizen-scientific method as well as observation. We gathered the records of observation throughout Jeju Island from November 2002 to December 2016. The Cinereous Vultures were found throughout Jeju Island from the Mt. Songak located at the western part of Jeju Island and to Hado-ri located at the eastern part of Jeju Island. Their advents were concentrated in the Jeju City located at the northern part of Jeju Island. The highest concentration of them was in the middle area of mountain where the pasture and grassland exist widely. This study proposed that most of sixteen vultures arrived in Jeju Island in 2002 went out across the ocean and two or three vultures remain present. We confirmed that the individuals arriving in 2002 had the appearances of adult in 2008, through the photos of appearance of the early, the middle and the latter stage of arriving. The rescued individual in 2012 was a subadult. We suggested that the survey about this individual regarding to the inhabitat pattern and the breeding should be carried out.*

[\[HTML\] Worldwide Engagement for Digitizing Biocollections \(WeDigBio\): The Biocollections Community's Citizen-Science Space on the Calendar](#)

ER Ellwood, P Kimberly, R Guralnick, P Flemons... - BioScience, 2018

*The digitization of biocollections is a critical task with direct implications for the global community who use the data for research and education. Recent innovations to involve citizen scientists in digitization increase awareness of the value of biodiversity specimens; advance science, technology, engineering, and math literacy; and build sustainability for digitization. In support of these activities, we launched the first global citizen-science event focused on the digitization of biodiversity specimens: Worldwide Engagement for Digitizing Biocollections (WeDigBio). During the inaugural 2015 event, 21 sites hosted events where citizen scientists transcribed specimen labels via online platforms (DigiVol, Les Herbonautes, Notes from Nature, the Smithsonian Institution's Transcription Center, and Symbiota). Many citizen scientists also contributed off-site. In total, thousands of citizen scientists around the world completed over 50,000 transcription tasks. Here, we present the process of organizing an international citizen-science event, an analysis of the event's effectiveness, and future directions—content now foundational to the growing WeDigBio event.*

[Why, What, How Much, and is it Worth it? Questions to Answer before Spending a Penny on Monitoring](#)

BA Wintle - Monitoring Threatened Species and Ecological ..., 2018

*Monitoring is regularly described as crucial for managing threatened species because it enables managers to understand the benefits of management options and determine how urgently they must be instituted to avoid extinction. However, useful monitoring does not come free, and money spent on monitoring one species is money that could have been spent on monitoring or managing another species. Because budgets for saving species are highly contested, monitoring must be carefully justified and planned. This chapter synthesises some ideas, approaches and quantitative tools that may help threatened species program managers decide whether they should establish a monitoring program for a species, ecosystem or threat and, if so, justify how much they should spend on monitoring to ensure it delivers on clearly stated, and measurable, aims in a cost-effective way.*

[The Technology Revolution: Improving Species Detection and Monitoring Using New Tools and Statistical Methods](#)

JJ Lahoz-Monfort, R Tingley - Monitoring Threatened Species and Ecological ..., 2018

*The advances in computing and processing algorithms further contribute to realising the potential of the technologies, including: web platforms to store and share data; mobile applications that empower citizen science.*

[Birdsound: Enticing Urban Dwellers to Engage with Local Birds around their Home](#)

M Sankupellay, A Kalma, S Magin, JL Cappadonna... - Proceedings of the 29th ..., 2017

*Many projects seek to engage urban dwellers to learn about local birds. However, many of these projects require some background knowledge that can be difficult to obtain independently. Our project explores how to make engaging with and learning about local birds easier. To do this, we designed and developed BirdSound, a device that engages people to record nature sounds and learn to identify bird species by sight and sound. We conducted contextual interviews with six people living in an urban environment, who were curious but not experienced in birdwatching. These interviews aided in attaining present frame of knowledge held by each participant. Then, we explored how these participants interacted with BirdSound in their homes. BirdSound sparked participants to recount experiences with the device, social interactions and knowledge of birds. BirdSound use required intense focus, and we can envisage more ambient approaches that also support more social forms of learning.*

[Shorebird Monitoring in Australia: a Successful Long-Term Collaboration among Citizen Scientists, Governments and Researchers](#)

BD Hansen, RS Clemens, E Gallo-Cajiao, MV Jackson... - ... Threatened Species and ..., 2018

*As citizen science continues to grow in Australia, this example of a hugely successful grass-roots movement for monitoring shorebirds shows that it is imperative the motivations and needs of volunteers are foremost in planning new programs.*

[Identification, Prioritization, and Assessment of Urban Quiet Areas](#)

A Tsaligopoulos, C Economou, YG Matsinos - Handbook of Research on Perception ..., 2018

*Urban growth retains a bipolar dissension regarding quality of life as it is both deleterious and beneficial for urban dwellers. Environmental noise could be considered a byproduct of growth, and according to numerous studies, it should not be ignored. The small urban setting of Mytilene located in the island of Lesbos (North Aegean, Greece) was the case study of this research. By implementing a novel protocol, the potential Quiet Areas of Mytilene were highlighted. The methodology consisted of noise measurements, soundscape recordings, and strategic noise mapping using the CadnaA noise prediction software. Furthermore, several soundwalks were conducted with the scope to obtain the citizen perspective regarding Quiet Area management. The way that city inhabitants perceive their acoustic surroundings could determine the character of the landscape along with the quality of the soundscape and define the meaning of quietness, which still remains vague.*

[Biotic Factors Affecting Ecosystem Services in Urban and Peri-Urban Forests in Italy: The Role of Introduced and Impending Pathogens and Pests](#)

S Moricca, M Bracalini, F Croci, S Corsinovi, R Tiberi... - Forests, 2018

*The present-day phytosanitary disasters caused by biological invasions are afflicting urban and peri-urban forest stands worldwide, as well as the varied services they normally provide. In Europe, we are witnessing an alarming situation due to an increasing introduction of infectious diseases and pests. The authors present an up-to-date list of alien microbial pathogens and insect pests affecting urban greening that have been accidentally imported in Italy or that are likely to be introduced. Information about the biology, epidemiology, ethology, and control of these invasive organisms is provided. For each species, the current geographical distribution, including newly-colonized areas, is also given, as well as the chronological progression of its occurrence. Particular detail is used for describing symptoms—the key diagnostic elements for appropriate and timely phytosanitary management. This paper will benefit urban forest management, which is a crucial factor in maintaining the social and ecological viability of urban green spaces, as well as ecosystem services. The importance of engaging citizens in community-based monitoring of urban greenspaces for tracking the location, abundance, and pathways of invasive pathogens and pests will also be touched upon.*

[Testing Environmental DNA Sampling and Predictive Modeling as Means to Investigate Wood Frog \(\*Rana sylvatica\*\) Distribution in Alaska and Northern Canada](#)

MA Spangler - 2017

*Alternative data, including that obtained from environmental DNA and citizen science monitoring, can boost efforts to further develop baseline knowledge of wood frog occurrence in these areas. Species distribution models generated in this research can help guide these efforts. Increasing knowledge of wood frog distribution may assist conservation managers to designate critical habitat, study climate impacts, and make more informed decisions regarding amphibians in northern landscapes.*

[\[PDF\] Image Recognition of Disease-Carrying Insects: A System for Combating Infectious Diseases Using Image Classification Techniques and Citizen Science](#)

JP Munoz, R Boger, S Dexter, R Low, J Li - Proceedings of the 51st Hawaii ..., 2018

*We propose a system that assists infectious disease experts in the rapid identification of potential outbreaks resulting from arboviruses (mosquito, ticks, and other arthropodborne viruses). The proposed system currently identifies mosquito larvae in images received from citizen scientists. Mosquito-borne viruses, such as the recent outbreak of Zika virus, can have devastating consequences in affected communities. We describe the first implemented prototype of our system, which includes modules for image collection, training of image classifiers, specimen recognition, and expert validation and analytics. The results of the recognition of specimens in images provided by citizen scientists can be used to generate visualizations of geographical regions of interest where the threat of an arbovirus may be imminent. Our system uses state-of-the-art image classification algorithms and a combination of mobile and desktop applications to ensure that crucial information is shared appropriately and accordingly among its users.*

[Our Dull Roar](#)

C Benitez - Wildlife Australia, 2017

*Using acoustic data to monitor the health of a habitat has been gaining momentum for years and bioacoustic technology is now accelerating research. With noise pollution sifting through to even the most remote and pristine habitats, Carolina Benitez explains how the growing discipline of soundscape ecology seeks to measure the impact of human sounds and listen for nature's reply.*

[\[HTML\] Identifying Barriers to Citizen Scientist Retention When Measuring Pollination Services](#)

B Kleinke, S Prajzner, C Gordon, N Hoekstra, A Kautz... - Citizen Science: Theory and ..., 2018

*Pollination Investigators is a citizen science program designed to quantify the pollination service provided within home gardens. The goal of our initial study year was to develop and evaluate an experimental protocol using a survey to gather participant feedback. At three workshops held in the spring of 2014 we distributed sampling protocols along with eight (two of each species) sweet pepper, cucumber, tomato, and sunflower seedlings to 64 volunteers. Volunteers established the seedlings in their home garden and compared fruit weight and seed set among open pollinated flowers with flowers bagged to exclude insect visitors. At the end of the season only 14.1% of volunteers submitted any pollination services data. Using a follow-up survey, we identified the steps within our protocol that prevented volunteers from continuing with the project, and prescribe protocol revisions to improve volunteer retention when measuring garden pollination services.*

[\[PDF\] The Mammal Fauna of Black Mountain](#)

M Evans - Black Mountain Symposium, 2018

*This paper provides a brief review of the mammal fauna of Black Mountain in Canberra, Australian Capital Territory. Information was sourced from fauna surveys and records held in various wildlife databases. The mammal fauna of the area is reasonably diverse and typical of the fauna of the woodlands and forests in the north of the ACT, with at least 26 native mammal species and 10 introduced mammal species having been recorded. Since gazetted as a nature reserve in 1970, it is*

apparent that Black Mountain still conserves a diversity of mammals, with arboreal species being particularly abundant. A conspicuous exception is the loss of small ground-dwelling native mammals from the area.

[\[HTML\] The Value of Citizen Science for Ecological Monitoring of Mammals](#)

AW Parsons, C Goforth, R Costello, R Kays - PeerJ, 2018

*Citizen science approaches are of great interest for their potential to efficiently and sustainably monitor wildlife populations on both public and private lands. Here we present two studies that worked with volunteers to set camera traps for ecological surveys. The photographs recorded by these citizen scientists were archived and verified using the eMammal software platform, providing a professional grade, vouchered database of biodiversity records. Motivated by managers' concern with perceived high bear activity, our first example enlisted the help of homeowners in a short-term study to compare black bear activity inside a National Historic Site with surrounding private land. We found similar levels of bear activity inside and outside the NHS, and regional comparisons suggest the bear population is typical. Participants benefited from knowing their local bear population was normal and managers refocused bear management given this new information. Our second example is a continuous survey of wildlife using the grounds of a nature education center that actively manages habitat to maintain a grassland prairie. Center staff incorporated the camera traps into educational programs, involving visitors with camera setup and picture review. The examples show how, with the right tools, training and survey design protocols, citizen science can be used to answer a variety of applied management questions while connecting participants with their secretive mammal neighbors.*

[Mammalwatching: A New Source of Support for Science and Conservation](#)

V Dinets, J Hall - International Journal of Biodiversity and Conservation, 2018

*During the 20th century, birding evolved from a little-known hobby into a global phenomenon important for ornithology and bird conservation. More recently a similar change has begun for mammalwatching, which is rapidly gaining popularity and is already providing financial support, observational data, diagnostic information, and a volunteer base for mammalogy and mammalian conservation. The study data suggest that mammalwatching has the potential to end decades of neglect of small mammals in dire need of conservation, to improve our knowledge of mammalian status and distribution, and to increase public support for conservation measures, especially for species not seen as particularly charismatic by the general public. Professional mammalogists and conservation workers can benefit from this new trend, but they can also help it. We offer a number of suggestions as to how professionals mammalogists and the amateur community can better work together to promote conservation and science.*

[\[HTML\] Predicting Population Trends Using Citizen Science Data: Do Subsampling Methods Produce Reliable Estimates for Mammals?](#)

K Callcutt, S Croft, GC Smith - European Journal of Wildlife Research, 2018

**Примечание: изложен негативный опыт применения научного краудсорсинга**

*Accurate assessment of population trends is invaluable in wildlife management, particularly for identifying species which are of conservation concern, and consequently, reliable cost-effective methods for their determination are highly desirable. In recent publications, the authors apply a subsampling method, used in several studies to quantify population trends from citizen science data for butterflies, birds, and plants, to assess the status of West European hedgehogs (*Erinaceus europaeus*) in England. Whilst the findings may be in agreement with expert opinion, we argue that this type of approach does not adequately account for spatial bias common in mammal data and that without further evaluation it is unclear whether the result is reliable or simply coincidental. To explore this concern, we apply the method across a range of terrestrial mammal species and compare the resulting trends to other published studies. Our findings show that the method fails to reproduce the accepted qualitative trends for the majority of species. Furthermore, comparison of trends based on data obtained from different sources produced conflicting predictions suggesting that the method is indeed vulnerable to survey bias. We therefore conclude that at present, without additional modification to address survey bias, this is not a reliable method for predicting population trends for*

mammals. However, more generally, this raises questions about the validity of subsampling methods based on citizen science data, and we would urge future studies to exercise caution by performing analysis across a suite of species including those with known trends for validation.

[\[PDF\] Scaling up public engagement in botanical research](#)  
AR Mast, ER Ellwood - American journal of botany, 2018

*Public engagement in botanical research has the potential to simultaneously advance research, science literacy, research sustainability, and workforce diversification goals, if strategies are carefully crafted and implemented to do so. Here, we briefly explore the present and future of projects engaging the public in authentic science (e.g., producing data fit for research use) in which the public is motivated by something other than payment. The engagement might be voluntary or not quite so (e.g., when part of a classroom exercise). Some projects engage the public in the data collection step alone (“contributory” projects), whereas others involve the public in the framing of the scientific question, the write-up of the work, and steps in between (“co-created” projects). “Citizen science” and “crowdsourcing” are recently coined, commonly applied terms to this public engagement in science, but other terms are also used. Our intention in this article is to provide a catalyst for professional botanists to find new success with public participation in their research with a few of our own observations, rather than provide an expansive review of the topic, no matter what label is applied to it.*

[Improving Our Science: The Evolution of Butterfly Sampling and Surveying Methods Over Time](#)  
K Kral, J Harmon, R Limb, T Hovick - Journal of Insect Conservation, 2018

*Butterflies are consistently the focus of conservation research because they contribute to ecosystem services, act as biological indicators, and are in decline worldwide. Land managers and researchers use many methods to measure butterfly populations, but this creates issues for standardization and production of comparative, rigorous data. To promote methods more appropriate for research-based conservation, we conducted a literature review focusing on the implementation and advancement of butterfly monitoring methods over time. We identified four main methods that are most frequently used in butterfly research and monitoring: (1) trapping and netting, (2) mark-recapture, (3) transects and (4) distance sampling. Although a progression of method development has occurred over time, all methods are still currently used in butterfly research, with trapping, netting, and mark-recapture used in 85% of studies.*

[\[PDF\] Developing a Pollinator Activity Guide for Pre K-6 Formal and Non-Formal Educators](#)  
AA Larkin - 2017

**Примечание: материал преподнесен с очень персональной точки зрения.**

*As a park ranger and naturalist, I am always looking for opportunities to provide and develop resources for other educators that encourage and foster a positive relationship with the outdoors. In this capstone I will focus on answering this question: how can I develop a pollinator activity guide for preK-6 formal and non-formal educators? This pollinator unit will include leveled lessons that are engaging and applicable for a wide audience and can be conducted in a groomed schoolyard or in a more traditional natural space. I’ve touched on how my relationship with the natural world was fostered throughout my childhood and how that led to my education and career choices in the fields of ecology, the environment and education. In the following chapters, I will 11 demonstrate the importance of introducing insects in a positive manner to students and why learning about pollinators is critical for future generations. I will provide more information about Minnesota’s native pollinators and their benefits to society. As well, I will present research that outlines engaging learning strategies that will be translated and incorporated into lessons within the pollinator unit.*

[\[PDF\] Addressing Pollution-Related Global Environmental Health Burdens](#)  
GM Filippelli, MP Taylor - *GeoHealth*, 2018

*New analyses are revealing the scale of pollution on global health, with a disproportionate share of the impact borne by lower-income nations, minority and marginalized individuals. Common themes emerge on the drivers of this pollution impact, including a lack of regulation and its enforcement, research and expertise development, and innovative funding mechanisms for mitigation. Creative approaches need to be developed and applied to address and overcome these obstacles. The existing “business as usual” modus operandi continues to externalize human health costs related to pollution, which exerts a negative influence on global environmental health.*

[\[HTML\] Estimating and Mitigating Post-Release Mortality of European Eel by Combining Citizen Science with a Catch-and-Release Angling Experiment](#)  
MS Weltersbach, HV Strehlow, K Ferter, T Klefoth... - *Fisheries Research*, 2018

*Several eel species have experienced severe population declines over the past decades, particularly the European eel (*Anguilla anguilla*), which is listed as critically endangered by the International Union for Conservation of Nature. To reduce fishing mortality, many European countries have introduced strict recreational eel fishing regulations increasing regulatory catch-and-release (C&R) practice. Despite high release rates, only limited information exists on the potential consequences of C&R on eels. A field experiment was conducted with pre-tagged eels in a semi-natural environment to investigate lethal and sublethal impacts of C&R. The experiment was combined with a citizen science study evaluating the effects of different hooks on catch rates, fish size, and hooking location to develop best practice guidelines. However, no significant effect of C&R on eel condition was found. The citizen science study showed that anglers can significantly decrease the catch of small eels, and thus release rates, by using large J-hooks. Furthermore, large J-hooks or circle hooks reduced the likelihood of deep hooking compared to small J-hooks. Post-release mortality of eels caught in recreational fisheries needs to be considered in future stock assessments and management plans to ensure conservation of the European eel. This study also highlights the strength of combining citizen science with experimental studies to develop best practice guidelines promoting fish conservation.*

[Usability of Citizen Science Observations Together with Airborne Laser Scanning Data in Determining the Habitat Preferences of Forest Birds](#)  
L Mononen, AP Auvinen, P Packalen, R Virkkala... - *Forest Ecology and ...*, 2018

*The use of Airborne Laser Scanning (ALS) enables investigating forest bird species’ habitat preferences in detail and over large areas. In this study the breeding time habitat preferences of 25 forest bird species were investigated by coupling CS observations together with nine forest structure parameters that were computed using ALS data and field plot measurements. Habitat preferences were derived by comparing surroundings of presence-only observations against the full landscape. Also, in order to account for bird observation location errors, we analysed several buffering alternatives. Our study shows that coupling CS data with ALS yield meaningful results that can be presented with distribution figures easy to understand and, more importantly, that can cover areas larger than what is normally possible by means of purpose-designed research projects. However, the use of CS data requires an understanding of the process of data collection by volunteers. Some of the biases in the data call for further thinking in terms of how the data is collected and analysed.*

[Community-Based Monitoring as The Practice Of Indigenous Governance: A Case Study of Indigenous-Led Water Quality Monitoring in The Yukon River Basin](#)  
NJ Wilson, E Mutter, J Inkster, T Satterfield - *Journal of Environmental Management*, 2018

*Indigenous peoples are increasingly developing Community-Based Monitoring programs to protect the waters and lands within their territories in response to multiple ecological and political stressors. Furthermore, CBM tends to focus on Indigenous peoples’ role as ‘knowledge holders.’ This paper explores CBM through a governance lens by understanding CBM as a strategy for the assertion of Indigenous sovereignty and jurisdiction. Research findings revealed that CBM is understood as both a method for generating data useful for decision-making and an expression of governance itself, rooted in understandings of stewardship, kinship and responsibility. Our findings also suggest that*

data quality and credibility, trust and legitimacy and relevance to decision contexts are key to mobilizing CBM data in relevant decision-making processes. We provide three recommendations to improve linkages between CBM programs and Indigenous governance: Indigenous governments must take a leading role in CBM programs; networked capacity between Indigenous governments can be built using a bridging organization; and CBM programs should be closely coupled with Indigenous environmental governance strategies. Results are derived from interviews with twenty samplers and ten other stakeholders with attention to ways to better inform internal and external decision-making processes.

### [Are Two Days Enough? Checking the Accuracy of the Survey Protocols Used in Common Bird Monitoring Schemes](#)

O Gordo - Ardeola, 2017

Common bird monitoring schemes have become an important tool in conservation biology because they provide useful information for assessing spatial and temporal variations of bird populations. However, recorded data may suffer from several observational procedures that cause error. In recent years, a robust mathematical framework has been developed to control for potential confounding factors affecting the assessment of the actual spatial and temporal variability of bird populations. Surprisingly few attempts have been made to check the effectiveness of current methodology empirically and thus to determine to what extent monitoring scheme data can provide accurate estimates of actual bird abundances. To check the effect of intra-annual variability of bird counts, I conducted daily surveys of House Martin *Delichon urbicum* and Common Swift *Apus apus* populations along a 2-km transect line in Tres Cantos (Madrid, Spain) between March and September 2005.

### [Testing the Value of Citizen Science for Roadkill Studies: A Case Study from South Africa](#)

S Périquet, L Roxburgh, A le Roux, WJ Collinson - *Frontiers in Ecology and Evolution*, 2018

Roads impact wildlife through a range of mechanisms from habitat loss and decreased landscape connectivity to direct mortality through wildlife-vehicle collisions (roadkill). These collisions have been rated amongst the highest modern risks to wildlife. With the development of "citizen science" projects, in which members of the public participate in data collection, it is now possible to monitor the impacts of roads over scales far beyond the limit of traditional studies. However, the reliability of data provided by citizen scientists for roadkill studies remains largely untested. We found that despite minor differences, the broad spatial and taxonomic patterns were similar between trained reporters and untrained citizen scientists.

### [Conservation Ecology of the Cape Clawless Otter, \*Aonyx Capensis\*, in an Urban Environment](#)

NC Okes - 2017

Coastal cities have impacted negatively on freshwater and marine ecosystems - primarily through habitat loss, fragmentation and pollution. The Cape clawless otter, *Aonyx capensis*, is the most widely distributed otter species in southern Africa and persists in human-modified habitats, including large cities. The Cape Peninsula provides a unique opportunity to study the impacts of urbanisation on otters as it presents a gradient from densely populated urban areas in the north (City of Cape Town) to sparsely populated areas interspersed with large expanses of natural habitat (Table Mountain National Park) in the south. In this thesis, I used Maxent to model otter distribution using citizen reported sightings over 5 years and compared the results with the occupancy model outputs. The predicted Maxent distribution mirrored that provided by occupancy models, and highlighted further areas of suitable otter habitat and routes for dispersal. Long-term monitoring of the population and the effect of proposed interventions can be achieved by creating a platform for citizen sightings to be recorded in perpetuity at low cost. This platform can also serve as tool for educating the public on the global challenges of conserving biodiversity within and adjacent to large cities.

[Co-Producing 'Post-Normal' Climate Knowledge with Communities in Northeast Bangladesh](#)  
S Bremer, M Stiller-Reeve, A Blanchard, N Mamnun... - *Weather, Climate, and ...*, 2018

*Concepts of knowledge “co-production” are increasingly encouraged in climate research, including as an extended mode of climate science inquiry. So-called “post-normal” science offers opportunities to advance this branch of co-production research with theory and methods. However, the literature lacks material of how to “do” climate knowledge co-production as extended science, and particularly as post-normal science. This paper presents an account of post-normal science theory and how it guided the TRACKS (Transforming Climate Knowledge with and for Society) project’s research practice, co-producing climate knowledge with communities in northeast Bangladesh. Key principles of post-normal science are described and explanations given of how they were translated into the research process, and specifically into workshops. The paper therefore provides insights for scholars and practitioners on one form of knowledge co-production, and thus contributes to this growing scholarship.*

[\[HTML\] Contribution of Citizen Science Towards Cryptic Species Census: “Many Eyes” Define Wintering Range of the Scaly-Sided Merganser in Mainland China](#)  
Q Zeng, Q Wei, G Lei - *Avian Research*, 2018

*Operated consistently and at broad geographic scale, the 3-year wintering surveys contributed a great deal of occurrence and abundance data of *M. squamatus* at various sites across China. The highly overlapped distribution ranges between years suggested that the wintering sites of *M. squamatus* were relatively stable. While long-term efforts are needed to estimate population status and dynamics of wintering *M. squamatus*, we demonstrated that well organized and coordinated citizen science can be used to define the wintering habitats with accuracy. Organizing and engaging volunteers to collect the required data across broad scale has tremendous potential to provide information for management and conservation of natural resources in general for a range of species and habitats.*

## **Медицина. Медицинская этика.**

Медицинские области всегда были хорошо адаптированы к взаимодействию профессионалов и добровольцев. Традиционные клинические испытания лекарств и лечебных методов по своей сути и предполагают предполагают такое взаимодействие. В числе работ последних лет интересно обратить внимание на исследования нового феномена неформальной науки: DIY - медицину и DIY - биологию. Согласно работе<sup>10</sup>, движение *Do-it-yourself* (DIY) объединяет преимущественно неспециалистов, стремящихся решать несложные научные задачи с использованием подержанного и списанного лабораторного оборудования. Вопрос о том, насколько реальны перспективы этого движения, остается открытым. Тем не менее, движение DIY-bio рассматривается как один из способов преодоления недостатков, накопившихся в большой биомедицинской науке.

[\[HTML\] Democratizing Health Research through Data Cooperatives](#)  
A Blasimme, E Vayena, E Hafen - *Philosophy & Technology*, 2018

*Massive amounts of data are collected and stored on a routine basis in virtually all domains of human activities. Such data are potentially useful to biomedicine. Yet, access to data for research purposes is hindered by the fact that different kinds of individual-patient data reside in disparate, unlinked silos. We propose that data cooperatives can promote much needed data aggregation and consequently accelerate research and its clinical translation. Data cooperatives enable direct control over personal data, as well as more democratic governance of data pools. This model can realize a specific kind of data economy whereby citizens and communities are empowered to steer data use according to their*

<sup>10</sup> Е.Г. Гребенщикова. DIY-bio: реальны ли перспективы биохакерской революции? // В сб.: Труды XXIV Годиной научной конференции - 2018. ИИЕТ РАН. - М.: Янус-К. - 2018 - с. 408-410.

motivations, preferences, and concerns. Policy makers can promote this model by recognizing citizens' rights to access and to obtain a copy of their own data, and by funding distributed data infrastructures piloting new data aggregation models.

### [\[PDF\] Crowd Sourcing to Bridge the Gap Between Science and Public Health](#)

B Schauer - *J Epidemiol Infect Dis*, 2018

*A One Health approach has been promoted for twenty years to strengthen control and prevention of zoonotic diseases. But barriers remain particularly limiting effective intersectoral cooperation between science and public health. Crowdsourcing is an online, distributed, problem-solving, and production model, which generally includes four elements: 1) An institution or an individual has a task or question, 2) a community (crowd) solves the task on a voluntary basis, 3) an online-platform facilitates the interaction of both sides, and 4) the result is an added value for the questioner as well as the crowd. We propose a crowdsourcing approach where individual scientists and public and veterinary health representatives can act both as questioners or crowd members. The combination of an online exchange forum, an integrated search database and targeted training making use of innovative media has the potential to break down historical barriers limiting intersectoral cooperation. This approach can encourage information exchange, improve translation of research into policy and practice and lead to more targeted science and advanced training*

### [Conceptual and Ethical Considerations for Citizen Science in Biomedicine](#)

A Fiske, L Del Savio, B Prainsack, A Buyx - *Personal Health Science*, 2019

*Patients and healthy citizens are taking part in biomedical research in unprecedented numbers and ways. While the lion's share of participation occurs in a 'traditional' manner where individuals volunteer to be researched, people without professional training are also increasingly contributing to scientific knowledge production as so-called citizen scientists. In many projects, lay participants share decision-making power with professional researchers, jointly setting the research agenda, planing the study, acquiring funding, and selecting the methodology. In some instances projects are led exclusively by 'lay' people who carry out data collection and analyses, and disseminate the results. Despite their diversity, all of these practices are often subsumed under the label of 'citizen science'. While enthusiasm for citizen science is growing, substantive ethical and political analyses of this phenomenon are still scarce. Differentiating among citizen science initiatives according to the main type of task that citizen scientists are expected to contribute, we provide a taxonomy to distinguish between different strands of participatory practices. As citizen science of medicine continues to develop, we predict that self-policing practices of stakeholders are likely to play an increasingly important role. We close by discussing emerging ethical considerations around these initiatives.*

### [Do-It-Yourself Biology and Medicine: History, Practices, Issues](#)

M Meyer - *Medecine sciences: M/S*, 2018

*Do-it-yourself (DIY) biology and medicine are based on various practices and logics: amateur and DIY practices, the ethics of hacking and open source, the drive to domesticate molecular biology and genetics, the ideal of participation and citizen science. The article shows that this democratization is a process that is at once spatial (construction of new spaces), technical (creative workarounds equipment), social (establishment of accessible networks/laboratories) and political. It is therefore through their practices, gestures and questions - tinkering, experimenting, working around, amaterializing, ethicizing, comparing, valuating, etc. - that we need to grasp DIY sciences.*

### [Smartphones Democratize Advanced Biomedical Instruments and Foster Innovation](#)

HC Koydemir, A Ozcan - *Clinical Pharmacology & Therapeutics*, 2018

*From microscopy to diagnostics and monitoring of vital parameters, scientists, engineers, and educators have been making use of smartphones and smartphone components in various innovative ways, helping to democratize advanced measurement instruments used in research and education.*

[\[PDF\] A Novel Approach to Crowd Sourced Websites Question Answering for Medical Knowledge](#)

C Chandiprasad, M Jayaram - 2018

*A standout amongst the most vital difficulties of removing information from the restorative group sourced Q&A sites is that the nature of question-answer sets isn't ensured. The inquiries asked by patients can be boisterous and equivocal. The appropriate responses' quality shifts because of reasons, for example, specialists' mastery, their level of responsibility, and their motivation of noting questions. To extricate valuable learning, it is critical to recognize significant and adjust data from disconnected or off base data. In this paper, we built up a proposed conspire Opinion Target Finding (OPF) that can consequently give superb learning triples separated from the boisterous inquiry answer sets, and in the meantime, evaluate aptitude for the specialists who give replies on these Q&A sites. The Medical Knowledge Extraction (MKE) framework is based upon a reality revelation structure, where we mutually assess dependability of answers and specialist aptitude from the information with no supervision.*

[Patient Involvement in Healthcare-Associated Infection Research: A Lexical Review](#)

A Dadich, M Wyer - *Infection Control & Hospital Epidemiology*, 2018

*This review examines patient involvement in healthcare-associated infection (HAI) research. Healthcare-associated infections represent an intractable issue with considerable implications for patients and staff. Participatory methodologies that involve patients in healthcare research are associated with myriad benefits. PubMed was searched to identify all publications on patient involvement in HAI research since 2000; publications were also identified from the cited references. A lexical analysis was conducted of the methods sections of 148 publications. The findings reveal that HAI research that actively involves patients and members of the public is limited. Patient involvement is largely limited to recruitment to HAI studies rather than extended to patient involvement in research design, implementation, analysis, and/or dissemination. As such, there is considerable opportunity to further this important research area via alternative methodologies that award primacy to patient expertise and agency.*

[\[HTML\] From Crowdsourcing to Extreme Citizen Science: Participatory Research for Environmental Health](#)

PB English, MJ Richardson, C Garzón-Galvis - *Annual Review of Public Health*, 2018

*Environmental health issues are becoming more challenging, and addressing them requires new approaches to research design and decision-making processes. Participatory research approaches, in which researchers and communities are involved in all aspects of a research study, can improve study outcomes and foster greater data accessibility and utility as well as increase public transparency. Here we review varied concepts of participatory research, describe how it complements and overlaps with community engagement and environmental justice, examine its intersection with emerging environmental sensor technologies, and discuss the strengths and limitations of participatory research. Although participatory research includes methodological challenges, such as biases in data collection and data quality, it has been found to increase the relevance of research questions, result in better knowledge production, and impact health policies. Improved research partnerships among government agencies, academia, and communities can increase scientific rigor, build community capacity, and produce sustainable outcomes.*

[MineAr: Using Crowd Knowledge for Mining Association Rules in the Health Domain](#)

M Someswar, A Bhattacharya - ... *Conference on Data Science and Management of ...*, 2018

*Crowdsourcing, where the power of the human thinking is harnessed to answer queries that are otherwise difficult for computers to answer, has been successfully used in many applications. A particularly interesting application of crowdsourcing is crowd mining, where given a dataset, patterns are learned by asking questions to the crowd. Crowd mining is extremely useful in situations where either the information is complex or it is not available in a systematic manner. In this paper, we target one such scenario, that of common health practices and cures. A web-based framework,*

called MineAr, is built to ask simple questions to the crowd. The questions ask whether a common product helps in a disease (such as ginger for cold). The crowd worker can choose an answer from different grades varying from "always" to "never", or can skip if she is not sure. Association rules are then mined from these answers using different aggregation techniques. Since not all the crowd workers can be relied upon, the system takes into account the confidence of the workers and, consequently, the rules are ordered according to importance. We also enhance the framework to enable prediction of answers of a new question for a crowd worker using her history. Finally, we construct a knowledge graph for searching and visualization.

### [Exploration of the Spatial Epidemiology of Tick Borne Pathogens of Livestock in Southern Cumbria](#)

LD Perrin – 2017

*Changes to farm production subsidies are provoking the maintenance of far less stock. Given that wildlife is more abundant in sustainable uplands, pathogens able to exploit both wild-living and domesticated hosts are of particular concern. Tick-borne pathogens are not only a case in point; but also their threat is now augmented by increasing tick abundance, changing climate, and the extraordinary nationwide increase in the abundance of deer (that serve as a key host species). The major objective of this thesis was to further understand the spatial distribution of questing Ixodes ricinus ticks across farms in Southern Cumbria; as well as to attempt to understand the epidemiological and ecological factors that have a significant influence on the patterns of infections in livestock. This project integrated field work, GIS, molecular methods and citizen science in an effort to understand these complex epidemiologies.*

### [\[HTML\] "Crowdsourcing" Ten Years in: A Review](#)

K Wazny - Journal of Global Health, 2017

*First coined by Howe in 2006, the field of crowdsourcing has grown exponentially. Despite its growth and its transcendence across many fields, the definition of crowdsourcing has still not been agreed upon, and examples are poorly indexed in peer-reviewed literature. Many examples of crowdsourcing have not been scaled-up past the pilot phase. In spite of this, crowdsourcing has great potential, especially in global health where resources are lacking. This narrative review seeks to review both indexed and grey crowdsourcing literature broadly in order to explore the current state of the field. Crowdsourcing has the potential to be hugely promising, especially in global health, due to its ability to collect information rapidly, inexpensively and accurately. Rigorous ethical and regulatory controls are needed to ensure data are collected and analysed appropriately and crowdsourcing should be considered complementary to traditional research methods.*

### [An Exploration of Citizen Science for Population Health Research in Retail Food Environments](#)

SJ Pomeroy, LM Minaker, CL Mah - Can J Public Health, 2018

*Public engagement is an essential component of public health research, practice, knowledge exchange processes, and decision making. Citizen science was first documented in the early 1900s as an approach to public engagement and there is growing interest in how it can be used in health research. This commentary describes how citizen science approaches were incorporated into a public engagement activity as part of a population health intervention research project on the retail food environment, a workshop we hosted called The Food In This Place in St. John's, Newfoundland and Labrador. We used citizen science methods and approaches to train and support participants to critically analyze a sample of everyday local retail food environments.*

## Другие приложения

В силу разнообразия и многовекторности добровольческой науки, не все работы последних лет удается однозначно и безусловно классифицировать. Например, описывается носящее характер эпидемии возрастающее увлечение построением генеалогических деревьев с

использованием больших баз данных сайтов типа Ancestry.com, Geni и подобных. Неожиданно большая мотивация состоит, например, в том, чтобы обнаружить, что у совершенно незнакомых людей задокументирован общий предок, живший, например, в XVII веке. Мало того, участникам предлагается за плату сдать тест ДНК, что дополнительно обогащает базы и позволяет обнаружить совершенно неожиданных родственников. Это редкий тип проекта, когда добровольцы платят за возможность углубленного участия. В итоге создается уходящее вглубь веков досье на ушедших жителей Земли.

В этом разделе ссылок немного. Совместное создание виртуальной реальности, управление экологией социальных медиапространств, совместный поиск плагиата - вот лишь несколько из разнообразных востребованных сегодня направлений добровольческой науки.

### [Visitors' Involvement in Cultural Organizations for a Better Experience](#)

C Francesco, G Luca - En Ettandant... International Meeting, 2018

*Cultural institutions are increasingly adopting a managerialization of their administration, i.e. the application of managerial concepts to non-profit organizations and other untraditional business to improve their efficacy and efficiency. In previous decades, a top-down approach was typically adopted, while the usefulness of a bottom-up approach to improve the products/services provided is increasingly evident from management studies. It has been demonstrated that the public should not be seen as passive but rather useful actors who can be engaged in improving the products/services provided by organizations in different fields. To this extent science is rediscovering the crucial role of user involvement anticipated by the community. In this vein, cultural institutions are increasingly interested in involving visitors to improve their experience.*

### [Crowd Computing for Social Media Ecosystems](#)

Z Zhang, KKR Choo, AK Sangaiah, L Chen - 2018

*The recent decade has witnessed the birth of social media ecosystems that brings social organizations, media content and various stakeholders together, and now it appears significant advantages of comprehensiveness, diversity and wisdom that provide users with higher quality of experiences. With the explosive increase of social users, as well as the popularity of pervasive (mobile) social media tools and services, more and more users are much addicted to share personal feeling, sentiment, idea and experience.*

### [\[PDF\] Web-Based VR Experiments Powered by the Crowd](#)

X Ma, M Cackett, L Park, E Chien, M Naaman - arXiv preprint arXiv:1802.08345, 2018

*We build on the increasing availability of Virtual Reality (VR) devices and Web technologies to conduct behavioral experiments in VR using crowdsourcing techniques. A new recruiting and validation method allows us to create a panel of eligible experiment participants recruited from Amazon Mechanical Turk. Using this panel, we ran three different crowdsourced VR experiments, each reproducing one of three VR illusions: place illusion, embodiment illusion, and plausibility illusion. Our experience and worker feedback on these experiments show that conducting Web-based VR experiments using crowdsourcing is already feasible, though some challenges—including scale—remain. Such crowdsourced VR experiments on the Web have the potential to finally support replicable VR experiments with diverse populations at a low cost.*

### [\[PDF\] Methods for Detecting Paraphrase Plagiarism](#)

V Thompson - arXiv preprint arXiv:1712.10309, 2017

*Paraphrase plagiarism is one of the difficult challenges facing plagiarism detection systems. Paraphrasing occur when texts are lexically or syntactically altered to look different, but retain their original meaning. Most plagiarism detection systems (many of which are commercial based) are designed to detect word co-occurrences and light modifications, but are unable to detect severe semantic and structural alterations such as what is seen in many academic documents. Hence many paraphrase plagiarism cases go undetected. In this paper, we approached the problem of paraphrase*

*plagiarism by proposing methods for detecting the most common techniques (phenomena) used in paraphrasing texts (namely; lexical substitution, insertion/deletion and word and phrase reordering), and combined the methods into a paraphrase detection model. We evaluated our proposed methods and model on collections containing paraphrase texts. Experimental results show significant improvement in performance when the methods were combined (the proposed model) as opposed to running them individually. The results also show that the proposed paraphrase detection model outperformed a standard baseline (based on greedy string tiling), and previous studies.*