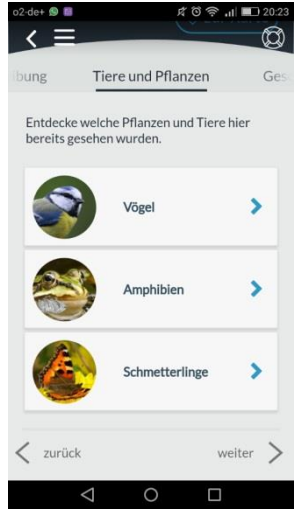
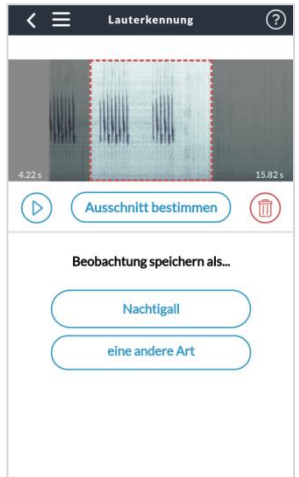
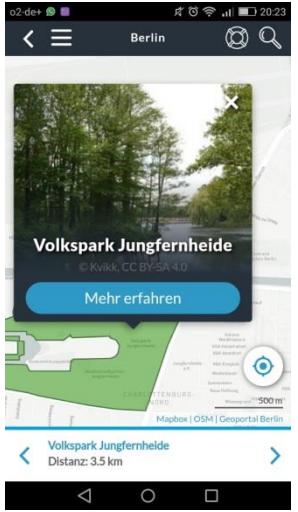
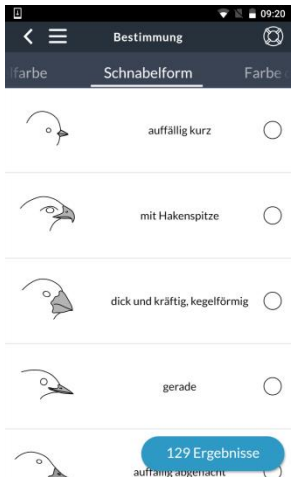
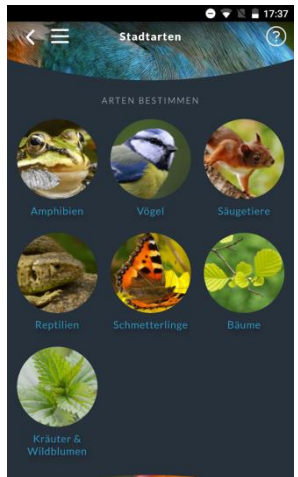
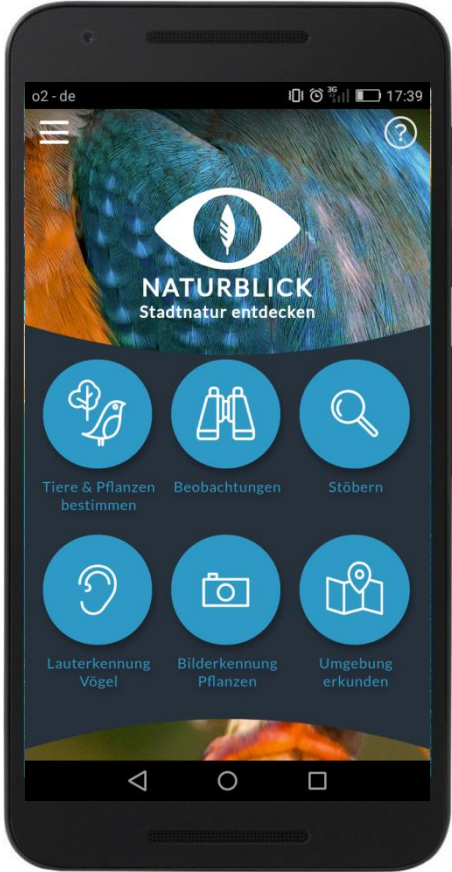


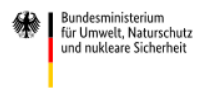
Mobile app and platform development in citizen science

Ulrike Sturm

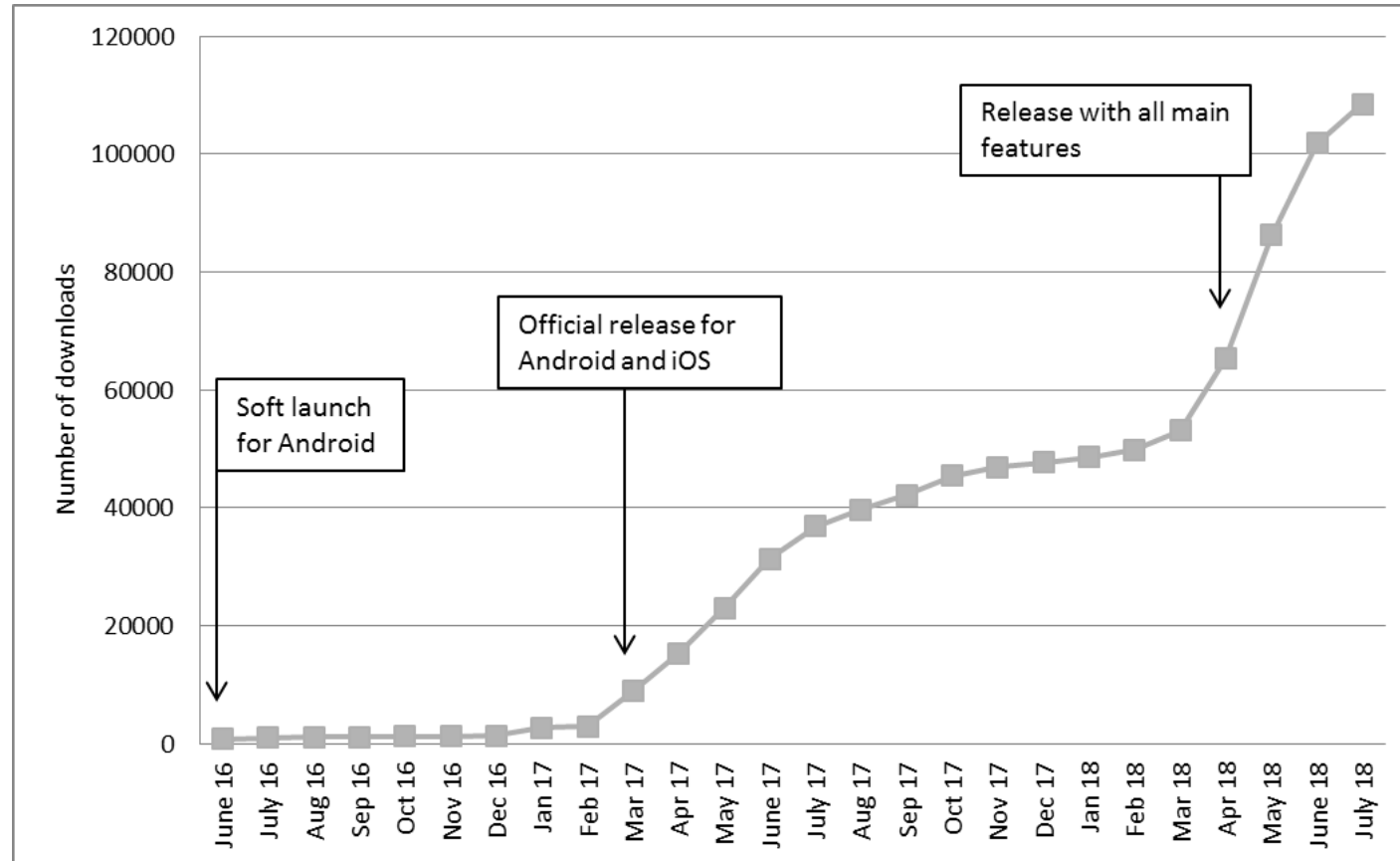
Naturblick



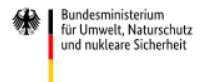
Gefördert durch:



aufgrund eines Beschlusses des Deutschen Bundestages



Gefördert durch:



aufgrund eines Beschlusses
des Deutschen Bundestages

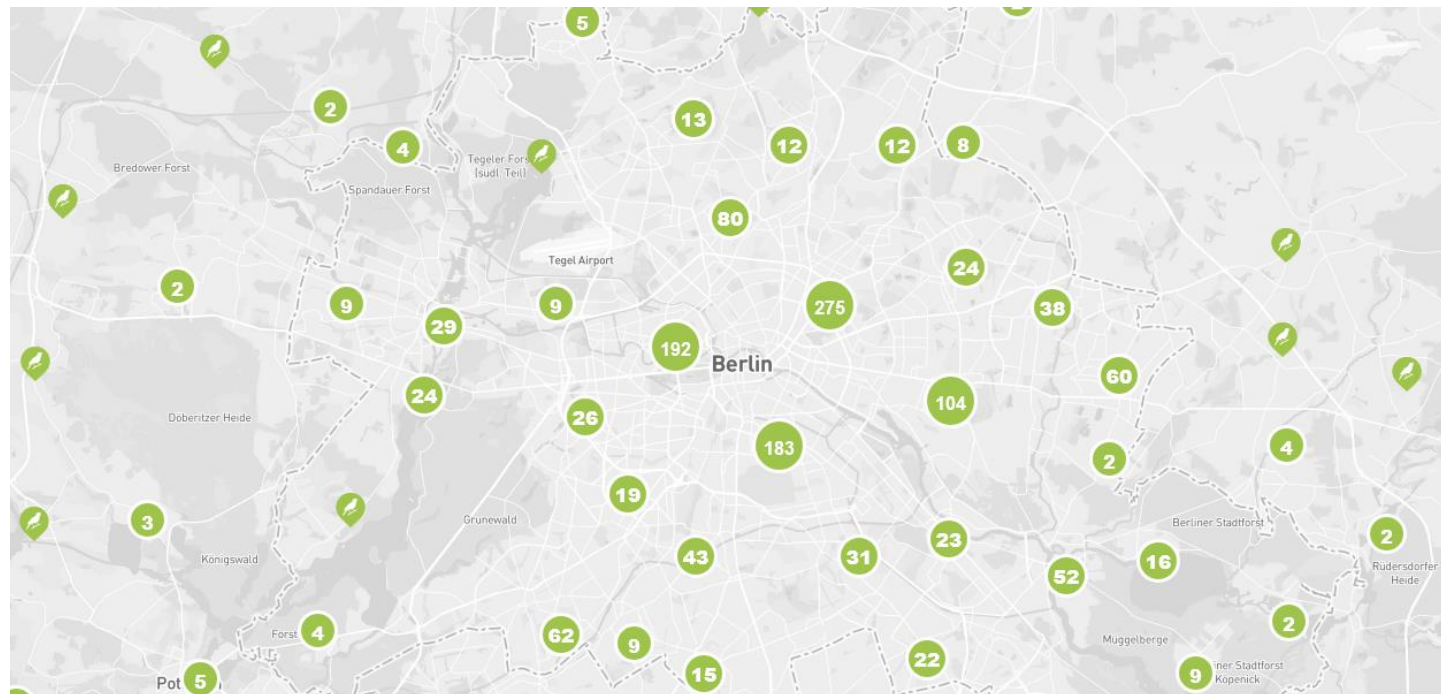
Mobile app and platform development in citizen science

Ulrike Sturm | Museum für Naturkunde Berlin – Leibniz-Institut für Evolutions- und Biodiversitätsforschung

Forschungsfall Nachtigall



- › Participants record nightingale songs with “Naturblick”. The recordings are analysed in regard to song dialects and habitat preferences.
- › 2.449 recordings were made by 1100 participants in 2018
- › 1766 recordings were verified nightingale recordings



<https://forschungsfallnachtigall.de/karte> (8.8.2018)

Mobile app and platform development in citizen science

Ulrike Sturm | Museum für Naturkunde Berlin – Leibniz-Institut für Evolutions- und Biodiversitätsforschung



Defining principles for mobile apps and platforms development in citizen science

1. Workshop

13th- 14th December 2016 in Berlin



Claudia Göbel

[Workshop Report](#)

2. Workshop

25th-27th April 2017 in Gothenburg



Soledad Luna

[Workshop Report](#)

43 recommendations



Research Ideas and Outcomes 4: e23394
doi: 10.3897/rio.4.e23394



Workshop Report

Defining principles for mobile apps and platforms development in citizen science

Ulrike Sturm[‡], Sven Schade[§], Luigi Ceccaroni^{||}, Margaret Gold[¶], Christopher C. M. Kyba[#], Bernat Claramunt[□], Muki Haklay[«], Dick Kasperowski[»], Alexandra Albert[^], Jaume Piera^ˆ, Jonathan Brier^ˆ, Christopher Kullenberg^ˆ, Soledad Luna^ˆ

[‡] Museum fuer Naturkunde, Leibniz Institute for Research on Evolution and Biodiversity, Berlin, Germany

[§] European Commission, Ispra, Italy

[|] 1000001 Labs, Barcelona, Spain

^{||} Natural History Museum London, London, United Kingdom

[#] GFZ German Research Centre for Geosciences, Potsdam, Germany

[□] Centre for Research on Ecology and Forestry Applications (CREAF), Barcelona, Spain

[«] University College London, London, United Kingdom

[»] University of Gothenburg, Gothenburg, Sweden

[^] University of Manchester, Manchester, United Kingdom

^ˆ Institute of Marine Sciences (ICM-CSIC), Barcelona, Spain

^ˆ University of Maryland, College Park, United States of America

^ˆ European Citizen Science Association (ECSA), Berlin, Germany

Corresponding author: Ulrike Sturm (ulrike.sturm@mfn-berlin.de),

Soledad Luna (luna@forst.tu-dresden.de)

Reviewable v2

Mobile app and platform development in citizen science

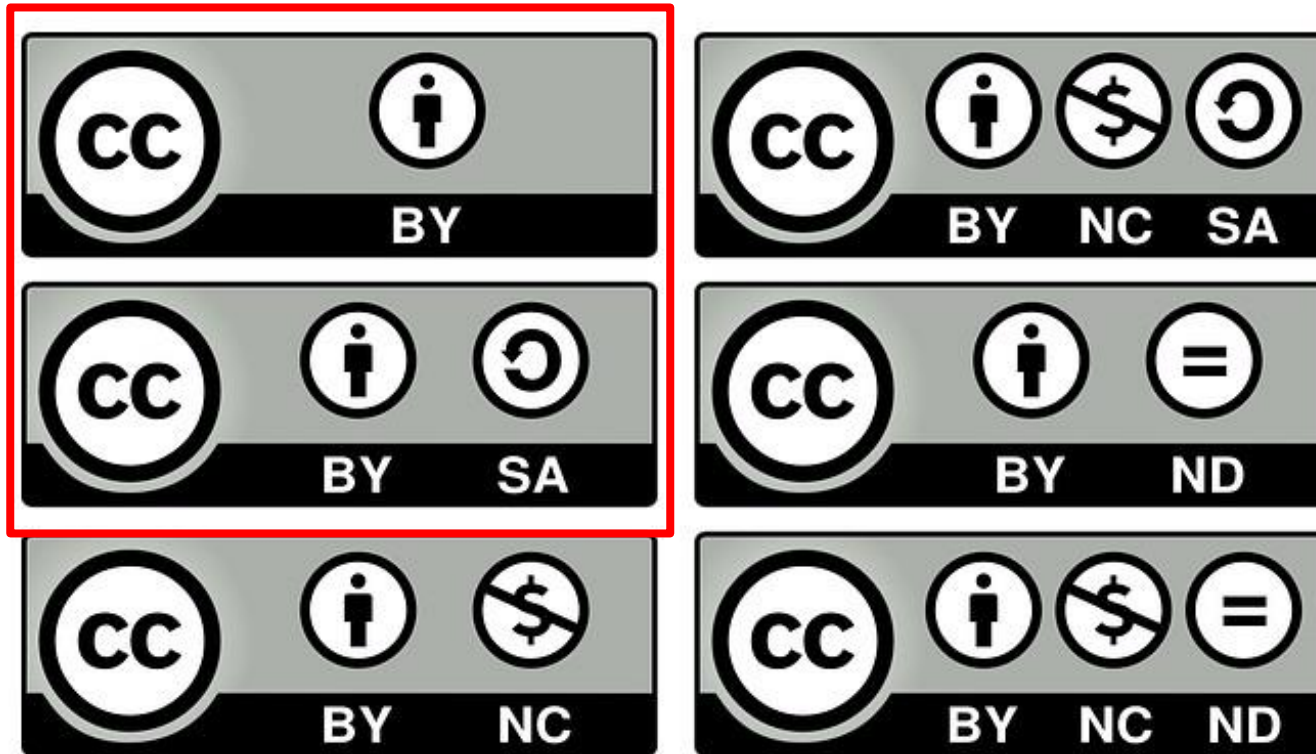
Ulrike Sturm | Museum für Naturkunde Berlin – Leibniz-Institut für Evolutions- und Biodiversitätsforschung

1. Sharing of outcomes and interoperability

1. Platforms, portals and apps should have an API to share as much data as possible, and open API standards should be followed where possible.
2. There should be transparency about what data are collected and where data is stored.
3. **The licenses of data, source code and other resources should allow for re-use. Pay attention to the differing restrictions of different open licenses.**
4. If sharing data and other resources with other countries, pay attention to national and international differences in licensing.
5. When writing the code, take into account the different levels of technical ability and keep reusability in mind (i.e. new projects can reuse the app or platform, and it should not be too hard to adapt the code for their purposes), especially coding conventions should be followed to ease take up.
6. It is preferable to open source the code base, but there are contextual situations where some limited closeness is necessary (e.g. long-term monitoring projects that require aggregation over time, and therefore consistency of the code base).
7. If sharing code, think about sustainability and discoverability. Examples are Github or the Astrophysics Source Code Library (ASCL) for source code in astrophysics.
8. Re-use also refers to the design (e.g. icons, and interaction), therefore, design should be based on existing standards if applicable (e.g. ISO/FDIS 9241-11 Ergonomics of human interaction). Design should be innovative but familiar. But be aware existing standards are in some instances not free to use and need additional investment of resources.
9. Existing fit-for-purpose platforms/project-portals/apps (and the communities using them) should be taken into account for re-use. We recommend that existing tools are built on and developed to the next level.
10. New developments should be well documented, if possible also in English (including the scope of use, any assumptions made, known limitations, and implications when using a particular solution).
11. If possible, use modular development of apps and platforms.
12. Consider multi-lingual translations of project documentation depending on the scale of the project.
13. If possible, use open standards for data and metadata, and use distribution services that make these accessible. Examples include ALA - BioCollect, SciStarter, PPSR-CORE - CitSci.org, The US Federal Crowdsourcing and Citizen Science Catalog, Dublin Core, GBIF - IPT, Project Open Data Metadata Schema - POD v1.1, CKAN API, DCAT, Schema.org, OGC, CobWeb, ADIwg, ISO 19115/19110, Inspire) until a recommendation is made available by CSA-ECSA-ACSA (foreseen by October 2017).
14. Each observation site/data point should have a universally unique identifier (UUID coming from an existing standard).
15. Implement interoperable quality assurance procedures (especially including validation processes).

Mobile app and platform development in citizen science

The licenses of data, source code and other resources should allow for re-use. Pay attention to the differing restrictions of different open licenses.



2. Communication and Design

1. Respect your participants by designing in a way that appreciates their time and lowers the barriers for entry. Think about ease of use, user friendliness, accessibility, and context.
2. Participants need to be able to communicate amongst themselves (e.g. in forums).
3. The design of apps and platforms for citizen scientists can be centered on a target group, or be developed to meet the needs of both communities in a co-creation process.
4. **Define your target group (the ones you try to reach), and design for their needs to attract and support them.**
5. Be as inclusive as possible. However, have in mind that the ideal target group size is project specific. In some cases, it is appropriate to narrow the target group in order to enhance recruitment and retention, or to maintain a higher quality of data.
6. Think about the participant's journey: "take care"/ consider participants throughout the processes of your project, think about their motivation.
7. Plan and understand the required level of engagement for the project: is it fine to have many on-off participants, or does the nature of the project require deeper long-term engagement?
8. Check your assumptions about the participants, e.g. do the people you want to reach have e-mail? Internet? Smartphones? Are they comfortable with technology? Do they have Wi-Fi connectivity or data in the field?
9. Consider the context in which participants are using the app or the website during the design phase. For example, consider the weather (will the participants be using mittens?) and the natural environment (is it wet?).
10. Take different levels of physical ability into account when designing the interface.
11. Take other aspects of inclusivity and accessibility into account. In particular design for people with visual difficulties.
12. Balance designing for citizens with designing for scientists, keeping in mind who the central users of the app or platform will be.
13. **Whenever possible, citizen scientists should be the co-creators of apps, contributing to the structure and design from the very start of development (i.e. not limited to testing).**
14. Design to prevent bias both in the participants demographic composition, as well as in the data collection, coverage, consistency.
15. Communicate constantly with the participants and react to feedback and ideas.
16. Design for communication: start by deciding on the right "tool" (app, platform, website, non- digital tools, or a mix).
17. Communication should be as direct as possible, and both sides should profit. Develop meaningful thanks/giveback within the app itself.
18. Unstructured learning and communication should be recognized as valuable. Allow unstructured space for informal learning and reflection among citizen scientists.

Mobile app and platform development in citizen science

Define your target group (the ones you try to reach), and design for their needs to attract and support them.



Mobile app and platform development in citizen science

Ulrike Sturm | Museum für Naturkunde Berlin – Leibniz-Institut für Evolutions- und Biodiversitätsforschung

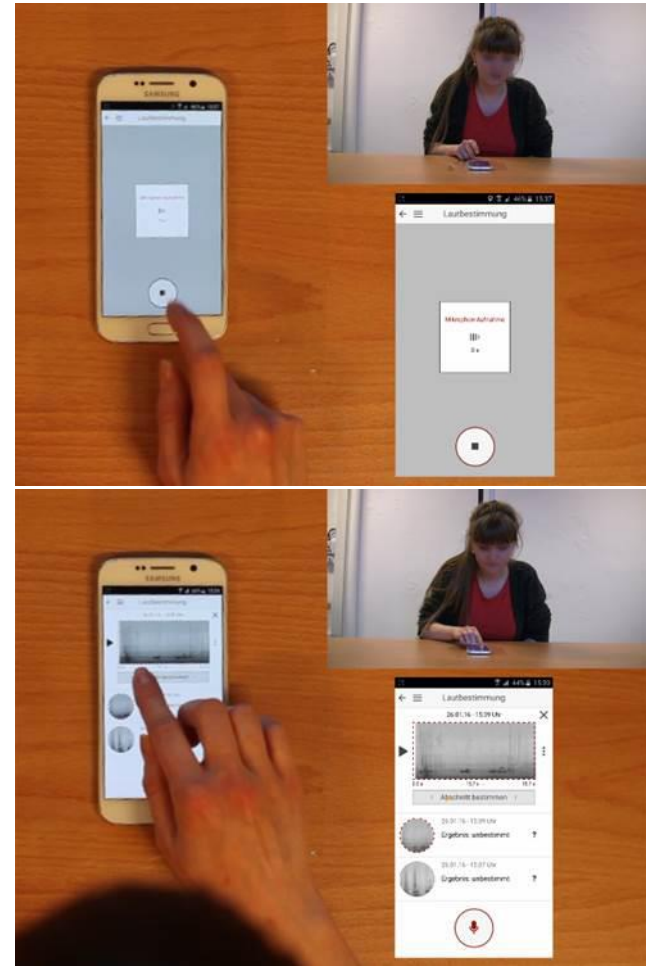
Whenever possible, citizen scientists should be the co-creators of apps, contributing to the structure and design from the very start of development



Mobile app and platform development in citizen science

Ulrike Sturm | Museum für Naturkunde Berlin – Leibniz-Institut für Evolutions- und Biodiversitätsforschung

Whenever possible, citizen scientists should be the co-creators of apps, contributing to the structure and design from the very start of development



Mobile app and platform development in citizen science

Ulrike Sturm | Museum für Naturkunde Berlin – Leibniz-Institut für Evolutions- und Biodiversitätsforschung

3. Ethical aspects

1. If you are planning a long-term project, you need to assess the need for a long-term sustainability strategy (that includes tech support communication, an appropriate resources over the life of the project) and put it into place if needed. Otherwise, do not even start!
2. Plan the lifetime of the project and the legacy of the project: does it have a natural ending point? (not just the end of funding, but an end to the research goal). Communicate that ending point throughout. If the project can continue beyond the end of funding, plan for longevity and sustainability, commit to on-going support or a hand-over. Data should be stored long-term and must therefore be planned for from the beginning.
3. Remove your app (from app stores or other online repositories) when it is no longer useful (and if you can't analyze or store the collected data).
4. Fully respect privacy of personal data. Take only as much personal data as required according to the objectives of the project, and delete personal data as soon as possible if they are not needed anymore in relation to project objectives.
5. Provide participants ways to decide about the privacy of their data.
6. Ensure that secure data transmission and storage are in place.
7. Particularly with regard to personal data, encryption is recommended, and only a minimum of App Rights Requests should be made on mobile devices.
8. Consider data privacy and intellectual property rights (IPR) that apply for your country or region, including also those at international level.
9. **Give transparent and easy to access information about the app and project. People should not need to download the app to find out what it does and how it relates to them.**
10. Include details about data protection, ethical use of data, and contact information within the app, and on the website or platform.

Give transparent and easy to access information about the app and project.

The screenshot shows the Google Play Store page for the 'Naturblick' app. The app is developed by 'Museum für Naturkunde Berlin Bücher & Nachschlagewerke' and is rated 'USK ab 0 Jahren'. The page features a detailed privacy policy section titled 'Überblick Datenerhebung'.

Überblick Datenerhebung
Sämtliche Daten werden zu rein wissenschaftlichen Zwecken erhoben. Sobald die Daten nicht mehr benötigt werden, löschen wir diese. Welche Daten in welchem Umfang erhoben werden, kann sich teilweise auch durch technische Notwendigkeiten ergeben.
Bei der Nutzung dieser App werden folgende Daten erhoben und auf den Servern des Museums für Naturkunde in Berlin anonymisiert gespeichert:

- Ton- und Bildaufnahmen

Die App nutzt das Mikrofon des Telefon um Tonaufnahmen und die Kamera um Fotos machen zu können. Die Aufnahmen werden anonymisiert gespeichert und zum Beispiel als Trainingsmaterial für die Mustererkennung verwendet. Auf Wunsch kannst du einen Autorennamen für die von dir aufgezeichneten Aufnahmen von Tönen und von Bildern angeben. Diese Daten dienen auch der Qualitätssicherung von Beobachtungen, die in Beobachtungsnetzwerken gemeldet werden.

- Metadaten der Aufnahmen oder Beobachtung (Art, Koordinaten, Zeit, Anzahl, Verhalten)

Die App benötigt den Zugriff auf den Standort, um die Metadaten zu Koordinaten und Zeit aufzunehmen. Diese Daten werden bei der Meldung von Beobachtungen in Beobachtungsnetzwerken verwendet und bei der Darstellung von Beobachtungen auf der Karte.

- Geräte-ID

Die App braucht die Berechtigung für den Zugriff auf das Telefon (Telefonstatus und Identität), um die Geräte-ID lesen zu können. Diese wird verschlüsselt an unseren Server gesendet, so dass wir keine Informationen über die unverschlüsselte Geräte-ID besitzen. Hierdurch ist es uns möglich, ohne Nutzerregistrierung (Login) unseren Mustererkennungsservice gegen Missbrauch zu schützen. Außerdem können wir so die Nutzung der App wissenschaftlich auswerten, ohne weitere Daten erheben zu müssen.

- Metadaten der Bestimmungsergebnisse (Koordinaten, Zeit, Bestimmungsverlauf)

Deine anonymisierten Bestimmungsergebnisse und die Nutzung der von uns entwickelten Bestimmungshilfen werden wissenschaftlich ausgewertet. Darauf basierend wird einerseits die App weiterentwickelt und verbessert und andererseits die Wirksamkeit der von uns entwickelten Werkzeuge untersucht.

Datenschutz ist uns sehr wichtig. Weitere Informationen zum Datenschutz findest du hier: <https://www.naturkundemuseum.berlin/de/datenschutz> und im Impressum von Naturblick.

Mobile app and platform development in citizen science

Ulrike Sturm | Museum für Naturkunde Berlin – Leibniz-Institut für Evolutions- und Biodiversitätsforschung

These recommendations are only that, recommendations.