

Abstract: Can you explain the whole project and its expected outcome(s). 1200

We build, strengthen and connect online commons with real-world commons.

The Green Steps ARK is a free and open-source platform which helps communities to connect with their human and non-human environment in a playful and educational way.

For schools, it is a powerful tool to seamlessly extend the classroom into the outdoors and complement existing indoor school information systems (SIS) effectively. By developing stewardship and ecological empathy for our hometowns, it sets a new focus on collaborative and regenerative learning.

For municipalities, the Green Steps ARK operates as a next level tree inventory with powerful functionalities to develop slow tourism projects and increase social capital within the community through inclusive commons stewardship activities.

For anyone else, it is a tool that helps to discover nature and communicate ecosystem services using various gamification techniques to nudge our behavior towards an eco-centric worldview.

The project outcome is more time spent outdoors, growing stewardship for commons and increased ecological awareness. The societal impact foreseen includes increased physical and emotional health, more social capital, and the unfolding of human potential (see IOOI and impact pathway graph in uploads).

Have you been involved with projects or organizations relevant to this project before? And if so, can you tell us a bit about your contributions? 2500

We are an interdisciplinary team that combines IT, ecological and pedagogical knowhow and experience. In the current set up we collaborate since spring 2021. Read more about our story here: <https://ark.greensteps.me/page/team/>

Lukas has been responsible for the development of the Green Steps ARK since the beginning and translates the educational and ecological specifications into appropriate technology that promotes the relationship with nature. He has been a freelance Linux system administrator and full stack programmer since 2007 and has since then gained extensive expertise in software engineering and UX/UI design. He studied East Asian Studies at the University of Brno and worked in various IT roles in Shanghai from 2013-2020. He is active in the Czech FOSS community, co-authored books about Ubuntu Linux and wrote articles for abclinuxu.cz.

Gloria has been instrumental in developing the [National Urban Park - St. Pölten](#) – a project application facing urban residents - since June 2021. She studied natural and environmental sciences at the University of Parma and completed a master's degree in biology with a focus on “Animal Adaptation and Behavioral Biology” at the renowned Dutch University of Wageningen. Her academic career has taken her to Costa Rica, where she worked with capuchin monkeys in the Lomas Barbudal Reserve, to Ecuador, where she researched the foraging behavior of capuchin monkeys in urban areas, and to Nepal, where she studied the foraging behavior of fallow deer in Bardia National Park.

Knut is a former tech lawyer and corporate executive with a life-long interest in social psychology and [technology's impact on humankind](#). Management in the sense of training people to perform better and education in the sense of leading people towards enlightenment, has become his focus during the last few years. His hope for the next generations has opened a path into social entrepreneurship and behavioral architecture [supporting NPOs](#) with their organizational development challenges. While interested in providing technological solutions to social problems, he qualified as environmental educator and secondary school teacher. Knut leads the pedagogical dimension of the project and writes on different channels like [Researchgate](#) about the future of work and education.

Explain what the requested budget will be used for? 2500

- Does the project have other funding sources, both past and present?

- If you want, you can in addition attach a budget at the bottom of the form

We are up to date self-financed or have a paid job to be able to contribute to this project. The only continuous funding we receive since 2021 (and at least until 2027) is through the EU's European Solidarity Corps programme, which finances two full time volunteers for 12 months each. The volunteers contribute to our project by testing, translating and improving the application.

We apply for the maximum budget of EUR 50k for a period of 12 months to further develop the application to be more user friendly (UX), integrating user feedback from the pilot projects we have already secured for 2025. We will continue to use our own financial resources to finance the current team, and utilize the budget to bring in missing human resources and competences in form of 2 or more full stack developers (onsite or remote, on service contract basis) aligned with the evolutionary purpose of our project and responsible for:

1. **Implementing user feedback:** The feedback we already got from the ongoing pilot project has translated into a high number of incremental features to be developed and bugs to be fixed. With current resources, we are unable to satisfy the needs of those who give the ARK a try and run into an obstacle.
2. **Improving UX:** In order to scale the user base, the UX must be improved to guide the users in different roles through the app. Currently, it is difficult to use the ARK without prior training.
3. **Accessibility:** With limited resources, this has not been our focus so far, and even though we stick to basic guidelines, there are many improvements to be made.
4. **Improving developer experience:** updating docs; full dockerization of the stack; increasing test coverage; working on technical debt (old dependencies).
5. **User-facing documentation:** we miss a technical-minded person who would take ownership of developing user-facing documentation, mainly by expanding our wiki (<https://wiki.ark.greensteps.me/>).
6. Improving and completing the features needed for our first target users: teachers. We have developed workshops for schools which require to use the ARK as an outdoor learning management system.

7. Federation and system resilience: prepare the ARK for federated operation to empower decentralized curriculum development and school outdoor learning management.

This said, we need advice on how to acquire further funding to make this much needed project financially sustainable, i.e. making full time contribution for us possible.

Compare your own project with existing or historical efforts 4000

- what is new, more thorough, different

1. Target segment school:

Existing apps for primary and secondary schools (Untis, SchoolFox, Teams, Bloomz, etc.) focus on the coordination of indoor spaces and the implementation of competitive national curricula. They accelerate the alienation of students and faculty from neighborhoods and communities and fail to assess a school's contribution to healthy commons, thereby exacerbating the destructive nature of formal education on people and planet.

We introduce a completely different approach to learning, which is reflected in the organizational structure of the web app: it defines the connection to and understanding of nature as pedagogical objective. A user is always part of at least one community, a home commons, and one of 844 ecoregions.

The anthropocentric design of a traditional Student Information System (SIS) is substituted with an eco-centric design in which our connectedness to and our role as stewards of nature is stressed. Uniquely, the ARK guides the implementation of place-based education and enables the co-creation and management of "outdoor classrooms".

The Student Grading System (SGS) is gamified and follows the triple focus of inter-, intra- and ecological intelligence. Knowledge about one's home ecosystem is reflected in the student's Bioregional Identity which measures natural and cultural features observed. The ARK therefore pioneers a new form of performance assessment.

2. Target segment municipalities:

Cities in advanced economies all over the globe have invested in proprietary software which manages their tree inventory. Widely used [ArcGIS](#) (e.g. in Paris and Berlin) has been developed by the US company ESRI. ESRI was founded as the Environmental Systems Research Institute in 1969 as a land-use consulting firm. The enterprise has a 40.7% share of the global market in geographic information systems, as of 2013. While ArcGIS leads this industry, there are many different commercial solutions. The assessed tree inventories show several deficiencies:

- every city has its own system / software
- offer only a scientific/urban planning visualization
- if accessible, no active citizen contribution possible
- usually only public trees are included
- no gamified educational nor touristic application
- no science communication facing the general public

The ARK can resolve several structural limitations which are the consequence of these separated tree inventories.

- Connect data of existing inventories into a networked Internet of Nature (IoN)
- use tree inventories for educational and slow tourism purposes
- make them accessible to the general public (no matter where you are)
- offer the tree inventory functionality to less affluent municipalities
- support the resurrection of commons by removing the boundaries between public and private land
- break down political borders on local, regional, national and international level
- empower citizens and strengthen local stewardship

The ARK combines the management of nature elements with place-based education. In particular urban nature is usually not a protected area like national parks but in most cases a web of larger single trees. The data of these trees are collected on the ARK (or imported from existing systems) and clustered in routes which offer to residents and visitors alike an outdoor learning experience which increases systems understanding and promotes ecological intelligence. In comparison to existing solutions, the ARK is developed in the digital commons under the AGPL license. We are also exploring the option of collective ownership.

What are significant technical challenges you expect to solve during the project, if any? 5000

Once a month we schedule a [crew call](https://ark.greensteps.me/page/manual-videos/) to share a new release and collect a first round of feedback from our most active users (<https://ark.greensteps.me/page/manual-videos/>). After each crew call, we prioritize the next development steps, define specs and translate them into Gitlab issues. We have many incremental development tasks which need to be dealt with the same priority as below technical challenges.

During the grant period:

1. **Usability and stability of the app:** Users need to be guided through the app intuitively and documentation must be linked extensively. Corner use cases must be better accounted for (different screen sizes, browsers, devices). Test coverage must be extended so that regressions are not introduced. Technical debt must be reduced (several outdated libraries are used). Loading speed must be optimized.
2. **Easy import of existing protected natural features data:** the import of existing data is an important first step to get new communities and commons kickstarted by avoiding that they build their local IoN instance from scratch. We found the nature monuments for our pilot project on a state government website and simply walked to each location to confirm what we found online. This approach is extremely time consuming and constitutes a major obstacle for similar projects to get started in a new commons. We therefore investigated public data available and tried to import all nature monuments for the state of Lower Austria. While the

data is public, it is not standardized and easily readable, therefore we had to design a simple LLM application which helped us to import more than 1400 nature monuments in one go. This pilot solution misses an interface which enables users to import public data in their home commons, and the ability to deal with the vast variety of formats the data comes in.

3. **Generation of default bioregion learning packages:** since we have defined the Bioregional Identity as one of the main learning objectives, measured as percentage of local species and specimens observed, it is paramount to define for each participating commons what “100% Bioregional Identity” includes. For the pilot project we explored our home commons for three years to generate species and specimen entries about trees, birds, insects, etc., which we think everybody should know. Again, this process was extremely time consuming, so we would like to support target users in other commons / ecoregions by providing them a package of the most common species which constitute their local Bioregional Identity. Ecoregion and Commons Mentors, two central moderating roles on the ARK, can then customize the default bioregion package according to their real world experience or educational focus. **In order to provide such default bioregion packages**, we need to work with data from sources like gbif.org (Global Biodiversity Information Facility). A pilot project has been started by one of our interns.
4. **Accessibility:** This was of a limited attention so far, we have to use available tools to analyze shortcomings and implement changes to allow the use by people with disabilities.
5. **Developer experience:** As we hope to attract more developers, both voluntary and through programs like GSOC, we have to improve the developer docs, initial setup, and add things like automatic merge request preview deployment.

Overall (exceeds the grant period)

6. **Building a “human-scale” Internet of Nature:** the dominant approach to the Internet of Nature (IoN) is one full of electronic sensors which deliver data about natural features like urban trees ([Galle et al., 2019](#)). This vision of the IoN extends the IoT approach to nature: connect plants like things in the world wide web. It renders human beings into passive onlookers rather than active agents. We believe that we need a “human-scale” IoN, in which predominantly people generate data about natural features by visiting, observing and caring for them. The IoN must empower local populations and help to educate new generations of indigenous people.

Describe the ecosystem of the project, and how you will engage with relevant actors and promote the outcomes? 2500

- **Which actors will you involve?**
- **Who should run or deploy your solution to make it a success?**

Developing neighborhoods, villages or entire cities into a network of outdoor classrooms requires the involvement of schools, teachers and the municipal government. Our project onboarding of interested teachers tries to understand the support from headmaster, colleagues and the municipal government. The more support there is in a new project location, the more likely it is that the local instance of the project succeeds.

Our web app is designed to be used by communities, in particular schools. However, use by municipal governments is very much intended. Schools benefit directly from the application by being able to extend indoor premises to the outdoors. Municipal governments will be in the short term interested to harvest the work done by students for the purpose of touristic development and / or nature conservation.

We have built an alliance with several stakeholders for the municipal pilot project in St. Pölten, for which we have been recognized by the lower Austrian government with the state award for outstanding environmental services. We have built a front end for the municipal government which turns the city into a National Urban Park (<https://www.nationalurbanpark.eu/>). A regional bank has sponsored our project and offered a downtown park to install a project demonstration. The pilot project is set to become an inspiration for other cities.

A [second project location](#) has been created in cooperation with a town government and a middle school in Ober-Grafendorf. A third project location has been created in cooperation with International School Krems. The school will showcase the project in an Austrian-Czech school exchange financed by the EU. A fourth project location will be built on February 11th in cooperation with a high school in Bad Radkersburg. The school plans to develop in cooperation with other schools, the adjacent five country biosphere park, stretching into Slovenia and Hungary.

We are also in close contact with the German speaking Transition Town movement, which has used the Green Steps ARK to organize its 2024 DACH conference and will use it again for its 2025 DACH conference on May 30th in Nürnberg, where more than 200 participants are expected.

As for deployment: We currently run the only instance (ark.greensteps.me), and don't promote the possibility to run your own. The idea is to support the growth of a user network, to facilitate knowledge sharing, not to create disconnected islands. We are, however, very much in favor of the fediverse model of independently-run federated instances. We are not pursuing this direction yet, and focus our resources on the needed functionalities. We would love to make ActivityPub powered decentralization a focus in the future.