

Section 1a – Details of the applicant

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Affiliation – institution	VU Amsterdam
Affiliation – department	Computer Science
Position	<i>Full professor</i>
End date of contract	permanent position
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Section 1b – Details of the team member(s)

Name team member 1	
Affiliation	
E-mail address	
ORCID ID	

Section 2 - Public summary
English public summary

The Hedy programming platform has attracted an active user base of teachers worldwide who do not only use Hedy for teaching, but also contribute lesson plans and translations. We currently have about 400.000 active users a month and about 200 contributors.

This new, open way of bringing educational research to teachers, without the traditional intermediate step of an educational publisher, allows researchers and teachers to collaborate on equal footing. Our community has grown extensively over the last few years, so more support is needed to help the community engage with each other, find appropriate lesson plans and improve localization.

Word count (max 100): 99

Dutch public summary

Het Hedy-programmeerplatform heeft een actieve gebruikersgroep van leraren over de hele wereld, die Hedy niet alleen gebruiken om les te geven, maar ook lesplannen en vertalingen bijdragen. We hebben momenteel ongeveer 400.000 actieve gebruikers per maand en ongeveer 200 bijdragers.

Binnen deze nieuwe, open manier om onderwijskundig onderzoek naar docenten te brengen, zonder de traditionele tussenstap van een educatieve uitgeverij, werken onderzoekers en docenten op gelijke voet samen. Onze community is de afgelopen jaren enorm gegroeid, dus er is meer ondersteuning nodig om de community te versterken, om goede lesplannen te vinden en om lokalisatie te verbeteren.

Word count (max 100): 97

Section 3 – Project proposal
3.1 The details of proposal

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Proposed project title and acronym	HCCL: Hedy: Community, Content and Localisation
Project duration (in months)	10 months
The project will primarily address	Citizen science
The project will secondarily address	Open platforms or tools
Relevance for a specific discipline	Informatica - Gebruikersinterfaces, multimedia; Onderwijswetenschappen

3.2 The vision for your project (Criterion: Alignment with the aim of the Call for proposals)

Hedy: A gradual approach can help

The Hedy programming language [1] is a platform to help students learn programming. Hedy started as scientific prototype, but attracted a dedicated userbase quickly. Hedy has now grown to a platform serving about 400.000 users per month worldwide. Our users are learners (10 to 15) and their teachers. Hedy is used at VU to do research (for example, we collect data to study how children learn programming) but at the same time serves as a platform for education, used by hundreds of schools daily.

The **aim** of this project is to support teachers who contribute to Hedy.

A global community of teachers

Within Hedy, teachers contribute to the platform in three ways:

- We often discuss the directions of Hedy with teachers directly, relying on their observations to prioritize research questions.
- Teachers can upload their own lesson plans, and share these with the larger Hedy community.
- Teachers can translate programming texts and course materials. We currently support 47 languages, including Chinese, Arabic, Hindi and Spanish.

The above is an example of **Citizen Science**: the users of our platform both *shape* research and *support* research. Our interviews with teachers show that they contribute because Hedy allows them to teach programming more effectively, but also because they feel part of a worldwide community of Hedy users.

Supporting a community requires technical support

The user facing part of Hedy has been extensively tested with students and is maintained by researchers at VU and open-source contributors. However, the community part of Hedy requires more support than we can currently offer. For example:

- We currently don't have a good way to communicate with our teacher users. With some of them, we email, we hold office hours and we also have a Discord channel, but there is no systematic way to communicate. A built-in forum or Q&A would serve our users better.
- The repository of user generated content is large and growing, and searching content for their classes becomes an increasingly difficult task, since we only show a simple list. The experience would be improved by enriching lessons with metadata and making them searchable.
- Adding new languages often leads to programming challenges, since languages have their own special characters and constructions, i.e. recently we had to adapt our parser (a program to process programs) to support the *ela geminada* (·) in Catalan. If we want to allow people to add more languages on the platform, this will require continued programming effort.

With this project, we will support Hedy, but we also we learn valuable lessons for supporting (voluntary) contributors to open source and open science platforms and keeping them engaged.

Word count (max 450): 447

3.3 Project plan (Criterion: Feasibility of the project plan)

Project plan

The goals for this project are threefold:

1. Better communications with teachers
2. Improve searchability of content
3. Improve support for all languages

1. Better communications with teachers

There are many situations in which we rely on input from teachers, for example when prioritizing research questions for studies or bug fixes, or to learn more about how they use Hedy. However, most of this communication is currently ad-hoc. We sometimes meet users at conferences, active teachers send us emails and we sent out surveys. However, the community will be strengthened if we integrate communications into the platform, by adding, ways for teachers to contact us, and vice versa, most notably with polls where teachers can vote on important issues.

2. Improve searchability of content

To make content better searchable, two separate approaches are needed.

Firstly, we need to add meta data to content. For example, teachers might want to tag what age group content is designed for, what (natural) language it is written in, what learning outcomes it aims for and what general themes occur in it. We will engage the current community to determine what metadata tags are needed. For existing content this means examining it and tagging it manually, for new content it means that our upload system will have to support tags. Secondly, we need to make the content searchable by the meta data and present teachers with a solid interface to search and recommend content. We will engage the community in enriching the content.

3. Support current and new languages

We currently support 47 languages, but not all languages are supported well enough. For example, right to left languages and non-Latin languages are less well supported since a lot of the tooling we rely on (from the parser to the editor) are built with Latin languages in mind. To fully support the teachers contributing on non-Latin languages, the support needs to be improved. During this project, it is also likely new languages will be added (we added 30 languages over the last 6 months) which can require additional programming effort.

Timeline

We divide the project duration into 4 phases. In the first month, the programmer to be hired will get to know the project. In the subsequent three phases of each 3 months, one of your subprojects will be addressed.

Phase	Month	Activity
Start	1	Getting to know the project
Community	2-4	Strengthen community
Content	5-7	Improve searchability of content
Localization	8-10	Improve localization support

Dissemination

Since communication with teachers is one of the core goals of this project, and since we already have so many active users, dissemination of results will happen on the Hedy platform itself. Existing users can immediately start, for example, to tag content and to benefit from increased searchability, and from new localization features.

Word count (max 500): 465

3.4 Project roles and expertise (Criterion: Feasibility of the project plan)

We aim to use the money provided to hire a programmer, who will work on built-in communication with teachers, content searchability and language support. This programmer will need experience in both Python (backend) and typescript (front-end) programming, and familiarity with our storage technologies (DynamoDB and s3) and with parsing. Ideally, they also have experience with localization and internationalization and some affinity with the user group.

The applicant will support the to be hired programmer in getting up to speed with the code base. She will also reach out to the current active contributors’ group to gain a deeper understanding of their needs and wishes within the scope of this project.

Word count (max 250): 110 words

3.5 Budget table

Type of costs	Short description	Costs in euros
Personnel	Non-scientific personnel HBO, 0.8 FTE, 10 months	€ 46,134
Travel	Visits to users	€ 3000
Total request from NWO		€ 49,134

3.6 Budget justification (Criterion: Feasibility of the project plan)

Because we engage with an existing community of (voluntary) contributors, this project only focuses on the technical support needed to continuously support them. Therefore, most of the budget will be spent on the salary costs for the programmer, who will work on the three directions outlined above: community management, content enrichment and localization efforts. We also expect them to actively engage with the current community, both online, but where possible offline, and as such include in the budget the option travel to conferences and workshops, to interact with current contributors, so observe how they interact with the Hedy system and how it can be improved.

Word count (max 200): 105

Section 4 – Open Science track record of the applicant

The main applicant has extensive experience turning research projects into open source. Part of her PhD work has been released as an open source package (see: <https://github.com/spreadsheetlab/XLParser>) and her more recent work on Hedy too has been shared as an open source project from its inception, allowing teachers worldwide to use Hedy, and with it, its scientific underpinnings, for free. In that way, Hedy circumvents the traditional process of research -> paper -> book or magazine -> classroom and directly allows research results to be used freely.

Furthermore, Hedy is not just open source in the sense that its source code is open and its use is free. The main applicant has also been able to create an open-source community: a community of programmers and teachers alike that work on Hedy, almost all of them volunteers. To date, over 300 people have contributed to code and content in 47 different languages.

Word count (max 200): 151

Section 5 – Data management (Criterion: Feasibility of the project plan)

5.1 Will this project involve re-using existing research data?

Yes: Are there any constraints on its re-use?

Yes, we will enrich existing user-generated content already made available on the Hedy platform under the EU

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licence.

5.2 Will data be collected or generated that are suitable for reuse?

Yes: Please answer question 5.3 and 5.4

The enriched user generated content will be made available for everyone to use, under the same conditions as the existing content.

5.3 After the project has been completed, how will the data be stored for the long-term and made available for the use by third parties? Are there possible restrictions to data sharing or embargo reasons? Please state these here.

All Hedy content and source code is available and www.hedy.org on www.github.com/hedyorg/hedy

5.4 Will any costs (financial and time) related to data management and sharing/preservation be incurred?

No: All the necessary resources (financial and time) to store and prepare data for sharing/preservation are or will be available at no extra cost.

Section 6 – Software sustainability (Criterion: Feasibility of the project plan)

6.1 Will software be generated during the project?

Yes: Please answer questions 6.2, 6.3, 6.4 and 6.5

6.2 How will the software be licensed and be made available for re-use?

Hedy (including donated user generated content) is currently, and will remain, available under the European Union Public License 1.2.

6.3 What measures are needed to make the software appropriate for long-term (re-)use by third parties?

Hedy's source code is maintained by researchers at VU and a group of open-source developers.

6.4 How large do you expect the community that will potentially use the software to be, and do you expect outside contributors to the software?

Hedy is currently used by about 400.000 users monthly. We expect that number to grow as it has over the past few years. Of these users, many are students (about 90%), about 7% are teachers. Of these teacher users, about 200 are currently active contributors to content.

6.5 What expertise do you expect to be needed to make the software appropriate for long-term re-use by third parties? Is this expertise available?

Hedy is currently appropriate for long-term re-use by third parties, it has an active group of maintainers for the open-source repository. The expertise needed within this project centres around supporting the teacher contributors.

Section 7 – Literature references

[1] Marleen Gelsing, Jesús Pelay, Felienne Hermans,- Design, implementation and evaluation of the Hedy programming language, Journal of Computer Languages, Volume 73, 2022,



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101158, ISSN 2590-1184, <https://doi.org/10.1016/j.cola.2022.101158>,
<https://www.sciencedirect.com/science/article/pii/S2590118422000557>

By submitting this form, I declare that:

I and all the individuals involved in this proposals satisfy the nationally and internationally accepted standards for scientific conduct as stated in the Netherlands [Code of Conduct for Research Integrity](#) (The Universities of the Netherlands): **Yes**

The research organisation has been informed of this grant application and the research organisation accepts the grant conditions of this programme: **Yes**

The team members named in this form have read and agreed with the submission of this proposal and have agreed with their role and intended contribution to the project, should this be awarded: **Kies een item.**

I have completed this application form truthfully: **Yes**
