

Eindhoven Engine Reading Helper (EERH)

People affected by Low Literacy (LL) may need help with paperwork and letters (from the city hall, medicals, finances, etc.) and therefore struggle to participate equally in society. The EERH aims to empower LL to gain autonomy and self-determination by digitalising written letters and making the information more accessible.

The core functions are explaining individual words and the whole content of the letter where applicable. Image, video, and audio features support the written word.

Level of education: Master

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Impact on society

What impact is expected from your technology?

What is exactly the problem? Is it really a problem? Are you sure?

2.5 million people aged 16 years and older in the Netherlands are low literate. This is 18% of the Dutch population (excluding kids until 15), which lacks the essential competencies needed to participate successfully and equally in our day-to-day society. The consequences of Low Literacy can be seen especially in the domains of employment, finance, health, family, communication, and shame of the affected people. There are not enough teachers to bridge that social gap.

Another problem is: many low-literate people struggle with paperwork like filling out forms or answering letters. Especially important medical, juristic, financial, etc., documents cause major problems when not properly dealt with. Therefore, many low literate people are depending on the help of others to deal with basic everyday issues.

Are you sure that this technology is solving the RIGHT problem?

The solution doesn't solve low literacy, but that is not the intention. On the one hand, we can fight individuals' low literacy, for example, through various learning programs. On the other hand, as a society, we can make advanced language skills less required.

The solution tackles more on the second aspect, by making people instantly able to deal with important documents and letters by themselves, despite their lack of literacy.

So the solution rather tackles the symptoms of low literacy. Nevertheless, there is potential to increase awareness (or decrease shame) and promote independent learning.

How is this technology going to solve the problem?

The technology aims to empower low-literate people immediately by translating difficult letters into easy language.

Instead of relying on others to explain letters (for example, from the city hall), the user can be more independent (empowered) by just using the App.

For the solution to work, the technology needs to be secure regarding sensitive data; it has to be reliable and not give any missed information; it must be easy to use and available for everyone; it should not be embarrassing or degrading when using it.

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What negative effects do you expect from this technology?

It can lead to a society where even more people end up low-literate because they no longer need good reading comprehension to deal with their paperwork. We accept this because some skills become obsolete over time, like making fire from scratch or calculating the root of a number by hand. Nevertheless, it should be considered how to not make people too dependent on the solution long term, for example, by promoting independent and sustainable learning.

If the solution is not completely reliable or can not detect fraud/scam letters, the trust in the technology will disappear. We wouldn't use a navigation system that only works accurately 90% of the time.

The collected data is mostly highly privacy relevant (juristic, medical, financial, etc.). When using Large Language models, it is important to be aware of what data is transferred to the AI and what bad actors could do with it.

In what way is this technology contributing to a world you want to live in?

This technology can contribute to bridging the social gap and leads to a more inclusive society.

People with lower literacy are more likely to struggle with their jobs, finances, social interactions, etc. These economical, educational, social, etc, disadvantages are often passed on to the next generation. This vicious circle can be (to some extent) broken by empowering low-literate people with the help of our solution.

Society should adapt to people that suffer from certain discriminations or disadvantages, instead of expecting everyone to fit into the norm of the majority. Such technologies can include people from all kinds of backgrounds that struggle with language and reading comprehension, not only the low literate ones.

Now that you have thought hard about the impact of this technology on society (by filling out the questions above), what improvements would you like to make to the technology? List them below.

The technology could be trained on data specifically provided by the relevant institutions (like the city hall). This can help to detect fraud and increase the reliability and quality of the answers.

The technology should include different features to communicate the results, like image, video, and sound options. But also the original text should be censored to ensure data privacy and prevent data abuse.

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Hateful and criminal actors

What can bad actors do with your technology?

In which way can the technology be used to break the law or avoid the consequences of breaking the law?

If technology gives legal advice to people that is not clearly defined, the user could knowingly break the law and blame it on the technology. Who becomes liable?

The technology can be used to manipulate people or even for propaganda and, therefore, cause thousands of people to break the law for them. Who becomes liable?

The owner of the technology can ask the designer or engineer to ignore ethical or juristic concerns when designing the solution. Who becomes liable?

Can fakers, thieves or scammers abuse the technology?

Yes.

The technology can not recognise whether a letter is fake, spam, fraud, or real. It can be used to ask people to give their private information, to transfer money, to blackmail or frighten. It can be used for propaganda purposes and manipulation.

If a user receives such a letter, the technology would only explain the content of the letter, and (maybe) evaluate the reliability of the answer (context explanation or summary). It can not question the validity of the original letter.

Can the technology be used against certain (ethnic) groups or (social) classes?

Yes.

So far, the technology aims to improve the lives of NT1, meaning only native Dutch speakers with low literacy.

Other groups like people with migration background, ex-pats, people with certain disabilities, ADHD, and others that share similar social disadvantages are not yet included in the solution.

The prerequisites to use such a solution, like economic strength, digital competencies, and others can also lead to the exclusion of people (those who are not digital literate or do not have the money to afford the app).

It seems unlikely, that this technology is used actively to discriminate against

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certain groups, given the original letter is not discriminating or actively discriminating factors are added.

In which way can bad actors use this technology to pit certain groups against each other? These groups can be, but are not constrained to, ethnic, social, political or religious groups.

Especially if governments are in control the solution, it becomes increasingly easy to connect personal data like demographics, race, gender, etc. with economic, medical, and social details. This can lead to misuse, especially in the political sense in form of disinformation campaigns and fake news on the (social) media. The data/solution can be used for personalised and polarising advertisement.

But also in the non-political sense online harassment, blackmail, and intimidation can be used with the knowledge of someone's personal, social, or economic situation. Bias in the algorithms is less significant in this technology. Nevertheless, the pre-knowledge or background of a person has to be considered when explaining the context of a letter, in order to know what can be expected to be obvious.

How could bad actors use this technology to subvert or attack the truth?

Most of it was already covered above. But this technology is especially sensitive to the truth. It helps people understand the truth and if it is faulty, people will easily fall for a trap.

Especially hackers can make use of the technology and steal data or misuse the explanation functions to spread their own misinformation. This can be totally invented misinformation or with a very smart system even just a slight alternation of the truth that has major consequences.

It can be used to create confusion and fear to attack democracy. It can be used to spread disinformation and propaganda by presenting wrong reasons for the situation explained in the letter. It can be used to especially target the most vulnerable people, that have no skills in double checking the output of the technology. It can also be more subtle and maybe even involuntarily by promoting stereotypes and and biases.

Now that you have thought hard about how bad actors can impact this technology, what improvements would you like to make? List them below.

The technology should be designed for and with as diverse a group of people as possible, to prevent exclusion and discrimination.

The intentions and interests of the different stakeholders should be

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thoroughly analysed. Especially, as the solution becomes more and more concrete as a business case.

The solutions should be frequently evaluated and tested for incorrect responses.

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Privacy

Are you considering the privacy & personal data of the users of your technology?

Does the technology register personal data? If yes, what personal data?

Yes,

The technology collects some of the most personal and sensitive data to a person. This includes name, address, BSN, etc. and potentially more details about their financial, medical, or social circumstances.

Do you think the technology invades the privacy of the stakeholders? If yes, in what way?

Maybe

The technology is used voluntarily and only by those who benefit from it functions. On the other hand, a person that is depending on the technology has little choice after all.

A person might feel exposed by sharing sensitive letters with the app, on the other hand if they don't share it with the app they have to share it with another person, which might be more or less invasive/embarrassing depending on the context.

Subsidiarity is considered by censoring the information (name etc.) as locally as possible on the smart device. This means, higher authorities or organisations have less access to it.

Proportionality is considered by comparing which large language models are available and suitable for solving the task of summarisation or simplification of a text. ChatGPT is currently the only available tool. Eventually, a language model trained on specifically such kinds of letters would be ideal.

Is the technology is compliant with prevailing privacy and data protection law? Can you indicate why?

Maybe,

In general it should be no problem but in the back of the technology is ChatGPT, a large language model which currently is still openly available. Nevertheless, the voices and doubts regarding data security of such a technology raise more and more. There is a chance that it will not be compliant with the European or Dutch law in few months.

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Does the technology mitigate privacy and data protection risks/concerns (privacy by design)? Please indicate how.

yes

No additional personal data is collected from the user, except for the information in their letters.

In the future it might be helpful to collect more data to profile people. Are they low literate, NT2, certain language disabilities, do they have ADHD, education level, etc. This might help to estimate what assumptions about their pre knowledge can be made and therefore tailer the solution better to their needs.

In which way can you imagine a future impact of the collection of personal data?

If the app data was stored and sold to third parties, it can compromise and affect the future life of the user in many ways.

Their financial history, for example if they ever were late for payments, can be used to assess their creditworthiness.

Their insurance can use the history of their health data to determine how much they have to pay.

If they ever got tickets or warnings, organisations can use this as blackmail or criteria to lable people as less reliable.

Especially, users of that app can be in general labled as low literate and incompetent and not independant, which can be used as hiring criteria and only enlarges the social gap.

Now that you have thought hard about privacy and data protection, what improvements would you like to make? List them below.

The highest priority for such a technology is to ensure that the personal information can not be linked to the individual. There has to be ways of censoring and deleting all data that can be traced back to the user!

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Human values

How does the technology affect your human values?

This category is not applicable for this technology.

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Stakeholders

Have you considered all stakeholders?

This category is not applicable for this technology.

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Data

Is data in your technology properly used?

This category is not applicable for this technology.

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Inclusivity

Is your technology fair for everyone?

This category is not applicable for this technology.

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Transparency

Are you transparent about how your technology works?

This category is not applicable for this technology.

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Sustainability

Is your technology environmentally sustainable?

This category is not applicable for this technology.

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Future

Did you consider future impact?

What could possibly happen with this technology in the future?

see utopian - dystopian scenarios...

Sketch a or some future scenario (s) (20-50 years up front) regarding the technology with the help of storytelling. Start with at least one utopian scenario.

In the first instance low literate people in the Eindhoven region can have access to such an AI tool. They are immediately empowered to manage their bureaucracy and government letters independently. As the technology advances, it becomes more versatile, reliable, and not only useful for the Low Literate. People with migration background, ADHD, mental and physical disabilities, etc. strongly benefit from it. This leads to more inclusion and equality in the society.

Later in time, every person uses such a tool as unconscious standard practice. The technology becomes as accepted and standardly used as any calculator or watch. Shame for using such technologies is not existing anymore. The education system adapted to the changing world and prepares students for constant and lifelong learning with help of such technologies. Therefore, this technology is crucial for learning, but also enables people to deal with problems independently.

In the future, hearing devices and glasses are combined with integrated cameras and microphones. Elderly people can very easily and intuitively use this tool without big efforts. Using voice command, verbal and visual explanations of the every day world can be incorporated. This is not only used by elderly people but also by tech lovers and soon the general population.

Sketch a or some future scenario (s) (20-50 years up front) regarding the technology with the help of storytelling. Start with at least one dystopian scenario.

On the other hand, such a tool can split society. If this tool is not affordable for everyone it will increase the economic gap and the related injustice. A design for native Dutch speakers (NT1) instead of also (NT1.5) can cause racial discrimination. Financially it makes sense to create solutions for expats, since that's where the money is available, but it again does not solve the intended problem.

But what if the tool is not successfully designed for learning? It can lead to a less empowered society. If everyone is depending on this technology, no one

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is able anymore to deal with the written word and complex analytic thinking, for example as required in juristic problems similar as often discussed within the topic of autonomous driving. What if the tool over simplifies juristic problems or gives insufficient advice, does the user become liable to prosecution, the engineer, the owner of the technology, etc. Who becomes ethically responsible and legally liable?

But what if this technology become too complex and creates a even bigger gap between digital un-/competent users. This leads to an even larger exclusion of certain groups of people. What if AI-developers and policy makers dont align on the ethics and rules in relation to AI (FutureOfLife, 2023). What if AI gets out of control by it self, or its being hacked by other institutions. It can lead to intentional miss information and manipulating people, that rely on AI. The Freedom of choice and speak can easily be compromised and democracy endangered.

Would you like to live in one of this scenario's? Why? Why not?

Overall, the utopian scenario leads to a more informed and empowered society, where people are able to navigate the complexities of bureaucracy and everyday life with ease.

The dystopian scenario on the other hand leads to a more split society that is more dependent on technology and therefore, vulnerable to misuse.

Personally, I'd love to see the utopian scenario become true. It aligns most with our personal values of equality, inclusion, and empowerment of the individual.

What happens if the technology (which you have thought of as ethically well-considered) is bought or taken over by another party?

Such a technology would be developed by Eindhoven Engine, an innovation accelerator with limited resources and the ambition of social impact over commercial profit.

Ideally, such a technology should be government controlled, based on the assumption that a democratic government has the best intention for the people. The positive social and ethical aspects should be highest priorety. We'd expect:

- an increase in accountability and transparency, becasue of the preasure of the people. This would increas trust in the technology for many people.
- stricter security rules to prevent data leaks, to companies and other governments.
- more equality from an economic perspective (pricing of the product)
- history shows that many initiatives in the field of low literacy do not succeed because of a lack of governmental (Dutch) interest, especially when it comes to funding.

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- Risk for abuse of power, especially to gain political power (for example, during elections), especially with the use of the collected data.

If the technology, for example for financial reasons, gets taken over by a private company, most likely the commercial value becomes most relevant. The social impact and ethical aspects can become less of the driving force. We'd expect

- an increased risk for data leaks, if the new owner has a less strict policy
- an increased risk for data misuse, by the new owner or by third parties to whom data might get sold.
- The new owner might change the terms/conditions/features of the solution in order to maximise commercial profit instead of the intended social impact
- less transparency about data collection, usage, and personal interests leads to mistrust and easier misuse.
- Loss of control from both the government and the user with regards to the technology

So far, there are no steps taken to ensure the technology is only used in the intended way.

Impact Improvement: Now that you have thought hard about the future impact of the technology, what improvements would you like to make? List them below.

The technology is not yet on a commercial level but is still in prototyping and development. We have to make sure that we are prepared for different possible scenarios, as the technology progresses. Core elements are:

- Constant feedback and monitoring of the intended and actual usage or impact of the technology
- Adding more advanced privacy and security features. Data that is not stored can not be misused.
- As the business case becomes more concrete, the interests of different parties are considered
- Be clear on responsibility, and accountability, and of course increase the transparency of the solution. Educate the user on the limitations and proper usage.
- Define clear rules on what should never be included in such a technology