

# Escape room AI using stresspatches

Measuring stress to increase the positive experience of an escape room.

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Context of use: Education  
Level of education: Bachelor

# Technology Impact Cycle Tool

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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?**

We're trying to make the escape room experience more dynamic. Giving people more options to complete them and a more challenging experience by measuring their stress and changing the the escape room based on it. It can't be truly called a problem, but it is still something we want to do for others

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

There are no RIGHT problems. There are only problems that people have or problems that people create. We have created our own problem. Escape rooms must become even more enjoyable so we're going to make it so.

### **How is this technology going to solve the problem?**

By making it so that the difficulty of an escape room can change depending on the amount of stress the users are experiencing

### **What negative effects do you expect from this technology?**

Escape room operators might become depended on this technology and use it to make the decisions for them instead of using it to aid them in their decision making

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

Our AI will help make an enjoyable experience even better. In doing so it helps people enjoy and relax. Joy is something that is needed in today's world. Though it's purpose is only for Escape rooms and thus it doesn't have a wide spread contribution to the world.

### **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.**

It's obvious that security is very important and that is something that needs to be increased at every possible opportunity.

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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?**

The AI makes use of health data from the participants of the escape room. This data could be stolen. There is also the possibility of third parties rewriting part of the data or just using the frame work to influence the amount of stress people experience while doing the stresscape rooms.

### **Can fakers, thieves or scammers abuse the technology?**

Escape rooms can try and charge more money for a more 'interactive' experience without actually using the AI. Selling of Health data is also possible. With enough skill the AI could be rewritten to no longer make the data anonymously. The AI could also be rewritten to dampen the peaks in stress that might shown an decrease in difficulty is needed and thus increasing the stress people experience instead of decreasing.

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

It might be possible that escape rooms will charge more for the 'interactive' experience the AI can give. Doing so might prevent poor people from enjoying an escape room

### **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.**

People can try to deliberately increase their stress inorder to make the escape room easier for themselves and less fun for the more calm people

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

Bad actors might try and show graphs or something similair of the 'stress' data to participants and show them that they, supposedly have some kind of illness in order to scam or harm them.

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

Instead of actually having the AI locally, it could be hosted on another server to increase security in the programming.

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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?**

If given permission by the participant then the biometric stress data will be saved for AI training purpose.

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

Since we are measuring stress data, it will always be an invasion of privacy. That is why we made strict rules about it and require permission before it's being used.

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

Our AI is compliant with the GDPR laws. We looked through the GDPR laws and we wrote down every article that is relevant. Those being: 12 through 18, 20 en 21.

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

Every piece of data is anonymously. Neither the AI nor the operator knows from who in the group the data comes.

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

There is no future impact with the collected data. Since the data is anonymously it can't be traced back to a certain person.

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

We have thought hard about this and as it stands, there is no further need for improvement.

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## Human values

How does the technology affect your human values?

### How is the identity of the (intended) users affected by the technology?

There should be no effect on their identity. As all data is taken anonymously, within a group and averaged in that group.

### How does the technology influence the users' autonomy?

The operator gets suggestions and advice from the AI. They must use their own judgement to see if it's viable advice. The AI is only a tool and the job can be done with or without it. However, some operators might become dependent on it through lazyness or lack of care.

### What is the effect of the technology on the health and/or well-being of users?

If used in the proper way then there will be an effect on the users stress levels. They will be kept a certian stress level inorder to increase the enjoyment that the users will get out of the escape room.

### Now that you have thought hard about the impact of your technology on human values, what improvements would you like to make to the technology? List them below.

We already changed the ai from making the decisions to only advicing and suggesting.

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## Stakeholders

Have you considered all stakeholders?

**Who are the main users/targetgroups/stakeholders for this technology? Think about the intended context by answering these questions.**

**Name of the stakeholder**

People doing escaperooms

**How is this stakeholder affected?**

Their experience in the escape room will change from the norm.

**Did you consult the stakeholder?**

Yes

**Are you going to take this stakeholder into account?**

Yes

**Name of the stakeholder**

People operating the escaperoom

**How is this stakeholder affected?**

They will get another tool to do their job and just like with everyother tool they might get dependent on it.

**Did you consult the stakeholder?**

Yes

**Are you going to take this stakeholder into account?**

Yes

**Did you consider all stakeholders, even the ones that might not be a user or target group, but still might be of interest?**

**Name of the stakeholder**

Escape room IT

**How is this stakeholder affected?**

He will have to make sure that all the hardware for the AI is working as it should

**Did you consult the stakeholder?**

Yes

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Are you going to take this stakeholder into account?

Yes

**Name of the stakeholder**

Unknown

**How is this stakeholder affected?**

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**Did you consult the stakeholder?**

Yes

**Are you going to take this stakeholder into account?**

Yes

**Now that you have thought hard about all stakeholders, what improvements would you like to make? List them below.**

There are no true improvements to make

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## Data

Is data in your technology properly used?

### **Are you familiar with the fundamental shortcomings and pitfalls of data and do you take this sufficiently into account in the technology?**

We made our prototype using, little and incomplete data. We are very much aware of the limitations of data. As we have not been able to find complete data set to train our AI. There is also the fact that the AI in practice can only give recommendations to the operator as we don't believe cutting away the human element is a good decision.

### **How does the technology organize continuous improvement when it comes to the use of data?**

It is possible that by knowing that the users stress is being measured, the user will experience increased stress. However that should be forgotten when the user starts the escape room. Because of the increased stress the difficulty will lower and the users will get an easier escape room to lower the stress.

### **How will the technology keep the insights that it identifies with data sustainable over time?**

The AI can train itself using the data it collects together with some feedback from the operator. That creates the possibility that it evolves in a way to fit certain groups of people. Depending on who frequents the escape room.

### **In what way do you consider the fact that data is collected from the users?**

Data collection and sharing is purely based on volunteers. If permission is given to use the data, then it will only be for the local AI. The data is not meant to be given, sold or shared with third parties.

### **Now that you have thought hard about the impact of data on this technology, what improvements would you like to make? List them below.**

we have already thought long and hard about it, which is why we made everything anonymously and based on volunteering. If the group doesn't want their data used then it won't be used. It's also the the majority of the group, must want their data being used for the AI to be able to do it's job. If that is not so then there is no reason to use it.



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## Inclusivity

Is your technology fair for everyone?

### **Will everyone have access to the technology?**

Only certain types of escape rooms can make use of the technology as there are physical requirements to the escape room.

### **Does this technology have a built-in bias?**

The data is used anonymously. The operator, ai or user can't see from who among the group the data comes from. Then again, it might be possible for the AI to get a preference of increasing/lowering the difficulty of the escape room based on previous gained data and thus it might be based against groups that tend to have a higher or lower stress baseline.

### **Does this technology make automatic decisions and how do you account for them?**

The AI only gives suggestions and advice. It can't make any actual decisions in its part.

### **Is everyone benefitting from the technology or only a small group?**

#### **Do you see this as a problem? Why/why not?**

Only people going to escape rooms will benefit from the AI and this is not a problem as that is the group we are focusing on.

### **Does the team that creates the technology represent the diversity of our society?**

We have both male and female students from 4 different studies, coming from 3 different countries.

### **Now that you have thought hard about the inclusivity of the technology, what improvements would you like to make? List them below.**

Our goal is very specific and it comes with a small group of people. In order to increase that group we would have to either adapt or make another AI for a different use.

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## Transparency

Are you transparent about how your technology works?

**Is it explained to the users/stakeholders how the technology works and how the business model works?**

Yes, everything about the AI is explained before the participants enter the escape room any questions they have can be answered then.

**If the technology makes an (algorithmic) decision, is it explained to the users/stakeholders how the decision was reached?**

Yes, we do infact explain to the users how the decision is reached.

**Is it possible to file a complaint or ask questions/get answers about this technology?**

Since we're students for a minor, it's hard to reach us about it. But Kinetic Analyse is a bigger company that can be reached about any question needed.

**Is the technology (company) clear about possible negative consequences or shortcomings of the technology?**

Is clear that the limited data used makes it a bit inaccurate, but it does not have any huge inpact.

**Now that you have thought hard about the transparency of this technology, what improvements would you like to make? List them below.**

We made an questionnaire and a hand out to inform the user about the AI.

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## Sustainability

Is your technology environmentally sustainable?

### **In what way is the direct and indirect energy use of this technology taken into account?**

As the AI is hosted locally, the energy consumption of the AI and PC it's running on depends on the environment of the Escape room provider. However the training of the AI also cost a lot of energy. Training a model is energy intensive and depending on how often the AI is trained and how much data is used, the required energy consumption also increases.

### **Do you think alternative materials could have been considered in the technology?**

We personally create the software and are not part of the making of the escape room or the stress patches.

### **Do you think the lifespan of the technology is realistic?**

It's a software based product, so it's life span is very long.

### **What is the hidden impact of the technology in the whole chain?**

The AI itself only requires the amount of energy it takes to run and power hardware that the AI is running on and a display to show the advice of the AI. There is quite a bit energy needed to make and power the hardware. Ofcourse there would also need to be escape rooms that can change their path for this to work. There are also the stresspatches that are used to measure the stress. However all of this is not something we can influence without making our own version of those items.

### **Now that you have thought hard about the sustainability of this technology, what improvements would you like to make? List them below.**

There might be ways to make the AI less intensive for the CPU and thus lower the amount of power the CPU pulls. The display itself can also just be two lights, 1 meaning difficulty up and the other down. However the amount of energy spared by this is minimum.

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## Future

Did you consider future impact?

### **What could possibly happen with this technology in the future?**

There should be no great change to communities. As the intended purpose of the AI is to better the escape room experience. It might be so that when the experience becomes better, people might be able to relax or de-stress more by experiencing the stress of a challenging escape room. This however is something that is different from person to person.

### **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.**

This question doesn't fit.

### **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.**

This question doesn't fit.

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

This question doesn't fit.

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

It is possible that another company or party can try and make use of our AI, but we haven't thought about it.

### **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.**

This question doesn't fit.