

Thank You For Applying

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Diploma Summer 2020

The Oslo School of
Architecture and Design

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Designing for the critical
future of automated hiring.

About.

This diploma is about Artificial Intelligence systems, their use in the recruitment industry, biased algorithms, and our attempts to demystify these systems to empower jobseekers.

Through carefully considered design interventions we have tried to raise awareness and facilitate critical reflection and debate around the role of automation in recruitment. Our secondary concern has been the current lack of ethics and oversight, and loss of agency that stem from the adoption of these technologies in our everyday.

Our goals for this project were to make automated AI processes in recruitment more comprehensible to those without expertise, and to enable a more critical and conscientious way of engaging with these systems.

Our interest in the general topic of Artificial Intelligence (AI) was spurred on by the recent media hype surrounding it, and its increasing presence in our lives.

We were curious to find out why AI was continually referred to as an impossible 'Blackbox' beyond the grasp of regular people. And why views on AI were polarizing and seldom neutral.

However, we were specifically introduced to the topic of Bias in Automated Recruitment via a newsline about a biased recruiting tool from Amazon that preferred men to women.

Intrigued by the news-story, we decided to dig deeper into what makes an algorithm biased.

Concurrently, we were grappling with the reality of ourselves as soon-to-be graduates and young job seekers, which further fuelled our interest.

In the first phase, desk research and interviews with experts informed our understanding of AI. Based on our findings we were able to narrow our scope, and, perhaps more importantly, define our roles as designers –to raise the right questions by making problems visible.

About.

A user-survey further helped us identify the primary concerns of job seekers who were subject to automated recruitment processes.

Our findings indicated that our project might hold the greatest value for skilled knowledge workers, therefore we chose to develop our concept with them in mind.

The pandemic lockdown resulted in some serious setbacks to our project including lack of access to our user segment. In response, we created an online living document to help generate the discourse needed to validate our ideas and carry the project forward. In addition to this we continued to share our research with our supervisors via live documents.

Our final delivery titled '**Thank You for Applying**' is a website comprising four scenarios situated on a timeline. Visitors to the website can interact with 'digital interventions' woven into its narrative.

Each scenario narrates a sequence of events in the lives of four jobseekers (representing four distinct user segments). In the storyline, the visitor is asked to put himself in the shoes of each character and to choose between two outcomes dealing with the consequences of the use of AI in that particular scenario.

A public comments and feedback section serves as a repository of the visitors' overall experience on the site asking them to join the broader general discourse on AI.

In testing this, we found that choosing between outcomes in each situation caused visitors to reflect on their preferred outcome and to consider the effects of automated hiring on their actual lives.

The choice of 'website' as platform was intentional, both for easy onboarding of a complex topic and for its UI flexibility. The structure of the site loosely borrows from the mechanics of a role-playing game.

The 'end product' is not necessarily a solution evaluable by the success metrics of production alone, but rather a critical exploration intended to nudge jobseekers to be vigilant and to interrogate –with an intent to disrupt– current AI practices in hiring.

Note from the authors.

A long convoluted path has lead to this body of work you see before you. We approached this project with a critical enthusiasm about the possibilities of design as an intervention tool.

In taking on this task we understood its challenges as a complex theme with multiple inter-dependencies, which also informed our ‘designing for a critical future’ approach.

On an ending note, the ongoing pandemic has lent this project an added meta-layer of urgency, as we observed automated tools for remote work (evaluation, production, and surveillance) being put to use in real-time, without question.

Throughout the project you will find [personal notes](#), [observations](#) and [annotations](#) that add meaning to our process, in [serif](#).

We hope you enjoy the fruits of our semi- automated labour.

—
Bedannita and Joshua

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Preface.

To start this report, we would like to share a selection of artefacts from our research over the last five months.

'Dehumanising, impenetrable, frustrating': the grim reality of job hunting in the age of AI

The automation revolution has hit recruitment, with everything from facial expressions to vocal tone now analysed by algorithms and artificial intelligence. But what's the cost to workforce diversity - and workers themselves?

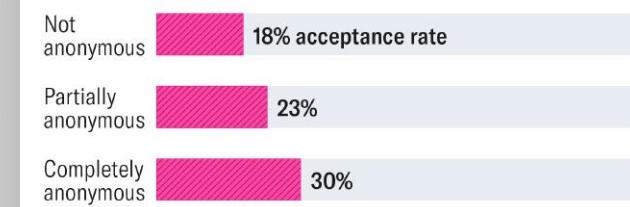


▲ The "pre-hire assessment" market is estimated to be worth £2.14b a year. Photograph: Gearstd/Getty Images/iStockphoto

[1]

How Anonymizing Applications Helps Women in Science

When gender-identifying information was removed from applications for research time at the Hubble Space Telescope, women's proposals were significantly more likely to be accepted.



Note: On average, women represented 23% of submitted applications.
Source: Stefanie K. Johnson and Jessica F. Kirk

[2]

Tech policy Nov 07

The AI hiring industry is under scrutiny—but it'll be hard to fix

The Electronic Privacy Information Center (EPIC) has asked the Federal Trade Commission to investigate HireVue, an AI tool that helps companies figure out which workers to hire.

[4]

Inhumans of late capitalism's post

I sometimes wonder what goes up the heads of employers. If they're looking for the best, hard-working employees, then why do they hugely take in mind superficial, unnecessary qualities like those (along with pre-assessment/psychological tests) & on top of that, go another mile investing in shit like those, instead of actually reviewing the person based off his CV, knowledge and skills/certificates? Generally speaking, filtering people based off their appearance, speech and others is vague and off-related to actually reviewing people, thus possibly admitting the actual, mediocre employees so then the very same bosses generally turn out unsatisfied with mediocre results. In other words, wouldn't it be wiser and better for employers to actually recruit good people? 😊

1 d Like Reply 3

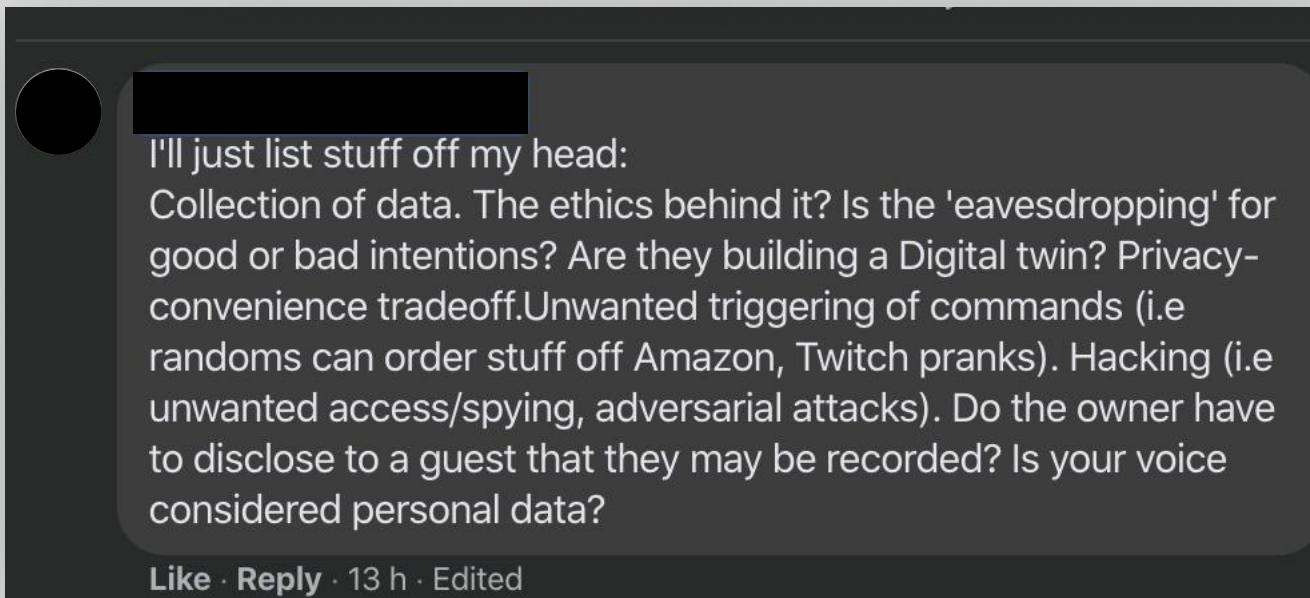
[5]

There was also a personality assessment, which includes impossible-to-answer questions like, Indicate the strength of your agreement with the following: I am annoyed easily by the stupid things other people do. WHAT? There's no way to answer that. Am I at work? In traffic? Does the annoyance last a nanosecond? Or am I consistently annoyed by others?

I am relatively new to looking for jobs (last time I had to look was 20+ years ago), and my, have things changed!

 18 |  57 | Feb 3, 2014

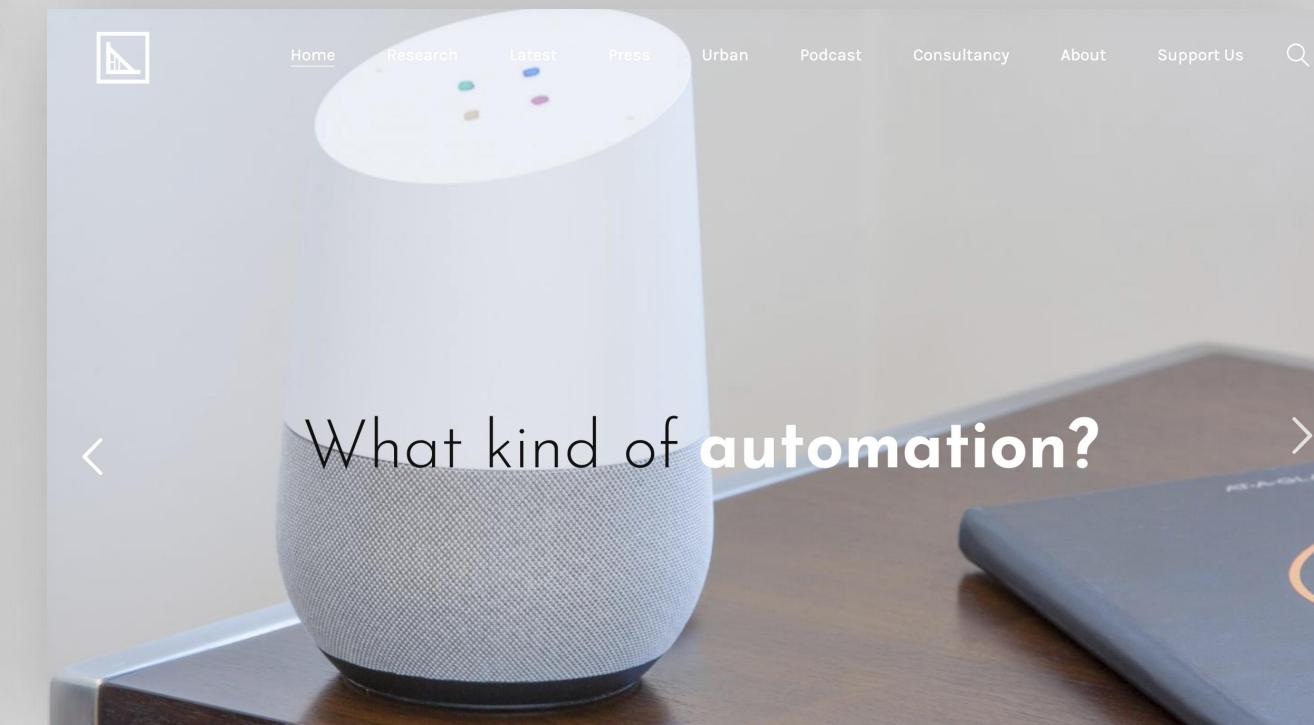
[10]



[6]

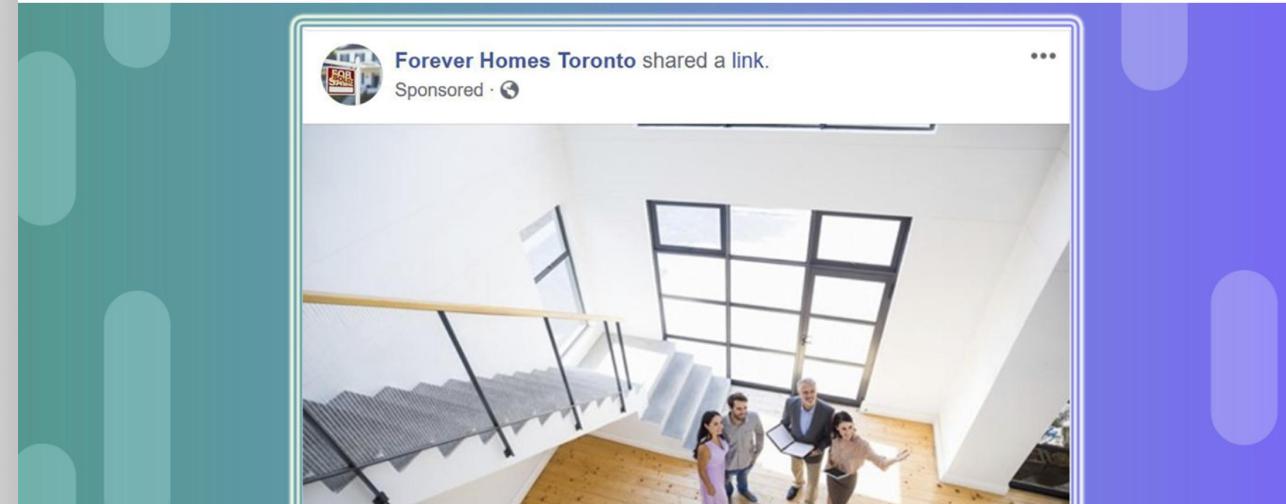
While AI is helping us understand business, design is helping us understand AI. A critical factor as, across industries, more

[7]



[9]

Facebook allowed housing and employment advertisers to exclude users with Indigenous interests



[8]

 The Medium App
An app designed for readers.

 OPEN IN APP

Acquiring data maybe seems simple to you at a first glance, but theres a lot that can go wrong. In AI & Machine Learning we say: “Garbage in garbage out”, which means nothing more than you get the quality out of your AI system, that you put into it during training.

As a result, automated hiring platforms have enabled discrimination against job applicants. In 2017, the Illinois attorney general opened an investigation into several automated hiring platforms after complaints that a résumé building tool on Jobr effectively excluded older applicants. The platform had a dropdown menu that prevented applicants from listing their college graduation year or year of a first job before 1980.

[11]

[12]

The Washington Post
Democracy Dies in Darkness

Technology

A face-scanning algorithm increasingly decides whether you deserve the job

HireVue claims it uses artificial intelligence to decide who's best for a job. Outside experts call it 'profoundly disturbing.'

HireVue: What to expect from a job interview

Question 2 of 4

Tell us about a time you needed to resolve a conflict. What steps did you take, and how was it resolved?

Video Response unlimited retries minutes: 3

Response time: 2:58 Done Answering

HireVue

This video by HireVue explains the tech firm's artificial intelligence-driven assessments for potential job candidates. (HireVue)

[15]

ideal.

Product Resources Customers Careers Contact Request a Demo

Screen Thousands of Candidates in Seconds.

Ideal is an AI-powered talent screening & matching system that helps enterprise teams make more accurate, fair, and efficient talent decisions.

Request a Demo Learn More

[13]

I hope to see increased interest and attention in the employee/career experience/journey. Maybe AI models will help show that taking genuine care of employees is best in the long run.

[14]

17



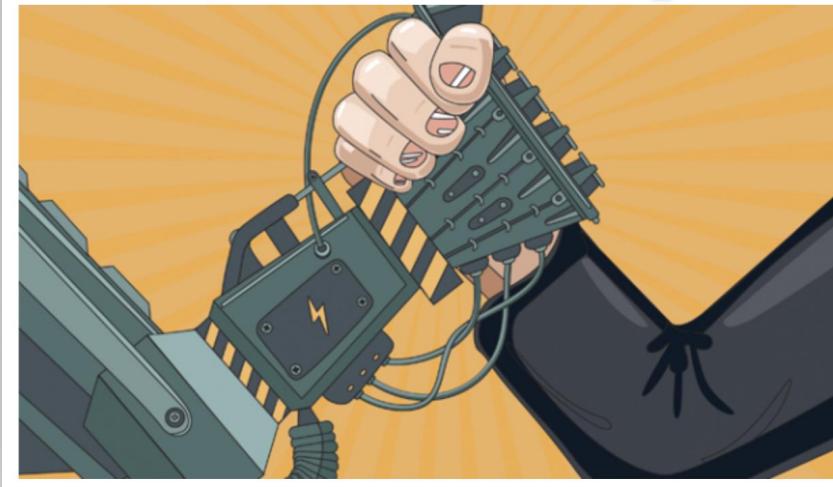
[16]

AI and your resume: How to beat the bots

Before you can interview for a new job, you must get past the AI tools that screen candidates. Experts share seven do's and don'ts for AI-proofing your resume

By Stephanie Overby | July 16, 2019

70 readers like this



Forbes

54,153 views | Mar 23, 2019, 10:31am EDT

How To Write A Resume That Passes The Artificial Intelligence Test



Kathy Caprino Senior Contributor

Careers

I cover career, executive and personal growth, leadership and women's issues.

Cookies on Forbes
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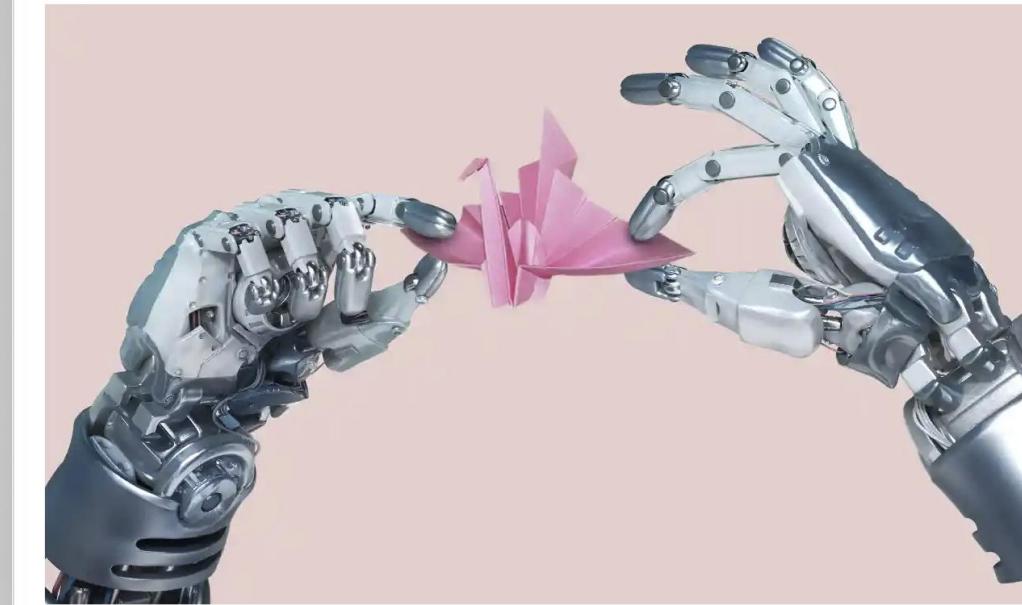


[17]

Top Employers UK

Will a robot recruiter be hiring you for your next job?

Finding the right candidate for a job is labour intensive and rarely easy, which is why an increasing number of companies are turning to artificial intelligences to streamline the process.



▲ AI: your future in its hands? Photograph: Paper Boat Creative/Getty Images

18



Can an algorithm evaluate you fairly?

An infamous example of AI gone wrong is Amazon's now defunct recruiting tool, originally built to review résumés and automate the search process.

The ensuing scandal exposed the tool as having a strong gender bias towards women, categorically excluding them from the applicant pool.

But Amazon is hardly the only AI offender...

Amazon reportedly scraps internal AI recruiting tool that was biased against women

The secret program penalized applications that contained the word “women’s”

By James Vincent on October 10, 2018 7:09 am



The HireVue Case

HireVue, another AI recruitment firm recently made headlines on similar charges.



'The Electronic Privacy Information Center (EPIC) called for a federal investigation into HireVue's practices arguing the 'firm has turned to unfair and deceptive trade practices such as "intrusive collection and secret analysis of biometric data" in its use of face-scanning technology to assess job candidates' "employability."' [23]

Technology

Rights group files federal complaint against AI-hiring firm HireVue, citing 'unfair and deceptive' practices

The Electronic Privacy Information Center urged the FTC to investigate HireVue's business practices, saying its face-scanning technology threatens job candidates' privacy rights and livelihoods.



Our Motive

Intrigued by the Amazon scandal and other similar cases, and the proliferation of automation – we decided to dig deeper into AI powered tools for the recruitment industry.

Also, worth adding, this project was partly born out of our shared struggles and anxieties as young job-seekers in a time of precarity and seemingly endless possibility.

We were living the problem and wanted to be part of the answer.

Background

The past five years have seen a sharp uptick in AI centric media sensationalism, fuelled by the rapid growth and adoption of a complex technology that is poorly understood.

Artificial Intelligence is advertised everywhere — but it's intended consumer base knows little about what it is or does. Popular media representation of AI by large corporations contributes to heightened expectations and misconceptions.

The recently released Norwegian documentary iHuman speculates what might happen if AI technologies were misused.

It mixes current trends with speculative future scenarios in a heady pop-science package complete with brooding, suspenseful soundtrack and a mildly alarmist narrative, further mystifying the topic and leaving the audience with a distinct sense of unease.



Why the current AI hype?

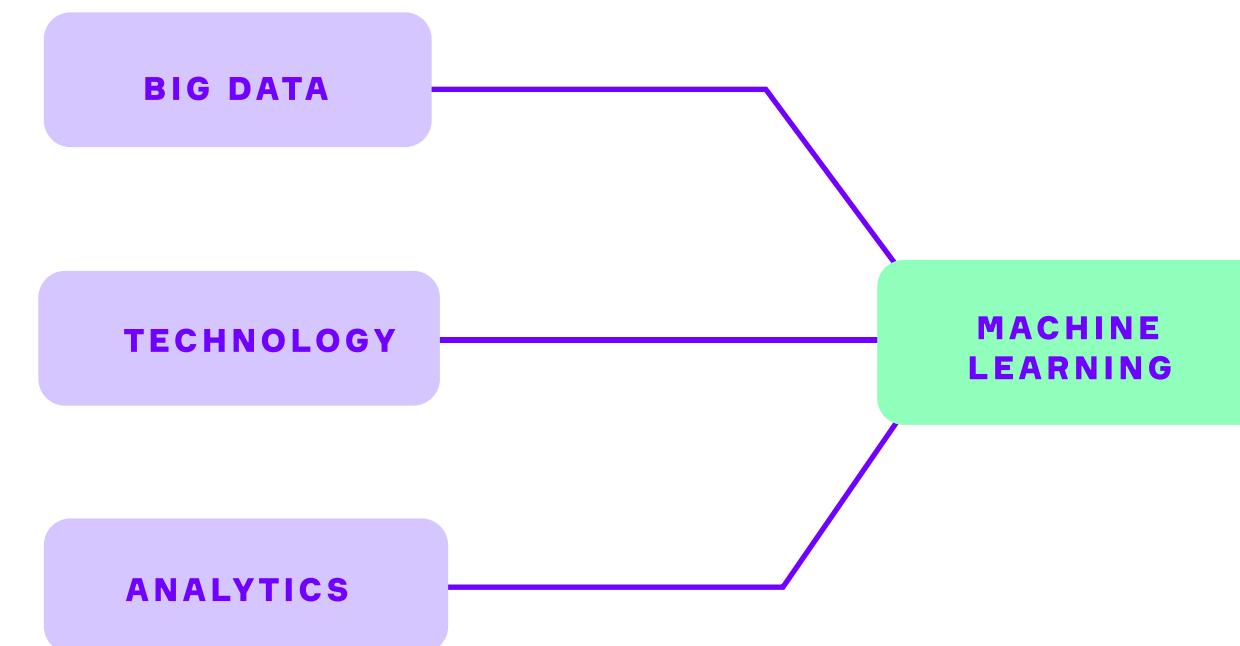
Automation has existed for decades, and the field of artificial intelligence itself dates back to the 80's. [25]

“What mainstream media calls AI is a folkloristic way to refer to neural networks for pattern recognition (a specific task within the broader definition of intelligence)” [26]

Matteo Pasquinelli,
AI and Media Philosophy professor

However, we now see 3 paradigm shifts* happening at once.

1. **Access to huge volumes of data**
2. **Unprecedented computation power**
3. **Upgraded analytics technology**



These 3 factors, in addition to the ubiquity of smartphones and mobile computing have contributed to optimal conditions for its adoption and growth.

*Source: SINTEF

The AI Impact Axis

In order to understand the effect of AI on our lives, we sorted areas of applied AI by their impact, from low to high-stakes.

In our axis, high-stakes imply a significant impact on the life of a human being.



Media
Recommendations



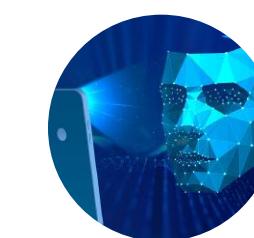
Voice Assistants



Customer Service



Online Shopping



Facial Recognition



Credit Approval



Uni Admissions



Criminal Justice



Employment

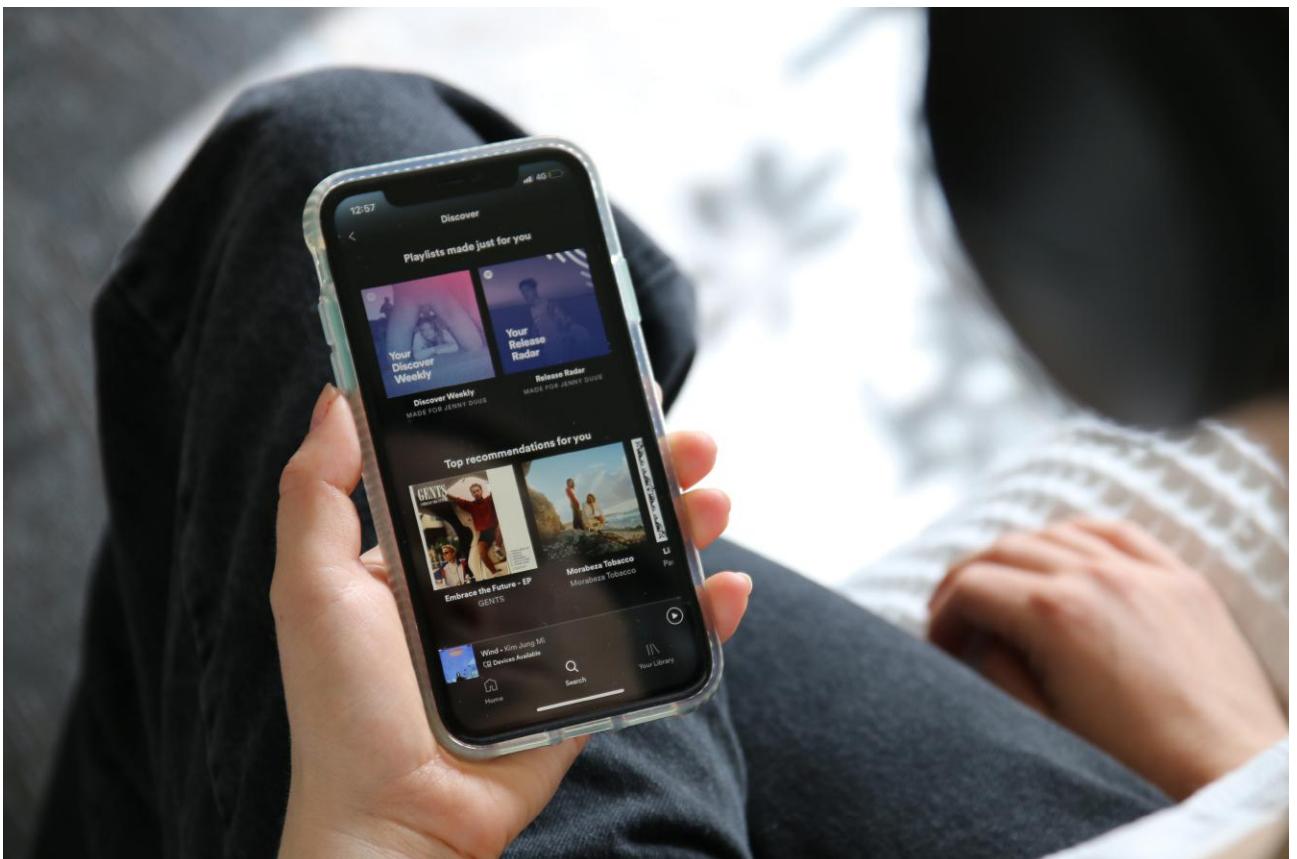


Military systems

low stakes

high stakes

The AI Impact Axis



In the case of Spotify and other personal recommendation algorithms, AI systems learn from personal behaviour and data, to predict what you may like. Other types of algorithms may also learn from external data that they are trained on.

“The truth is that business has become too complex and is moving too rapidly for boards and CEOs to make good decisions without intelligent systems.” [27]

MIT Sloan researchers



And while examples like Spotify, Netflix etc. are relatively harmless, automation is also applied in more high stakes areas such as Employment.

AI in the Recruitment Industry

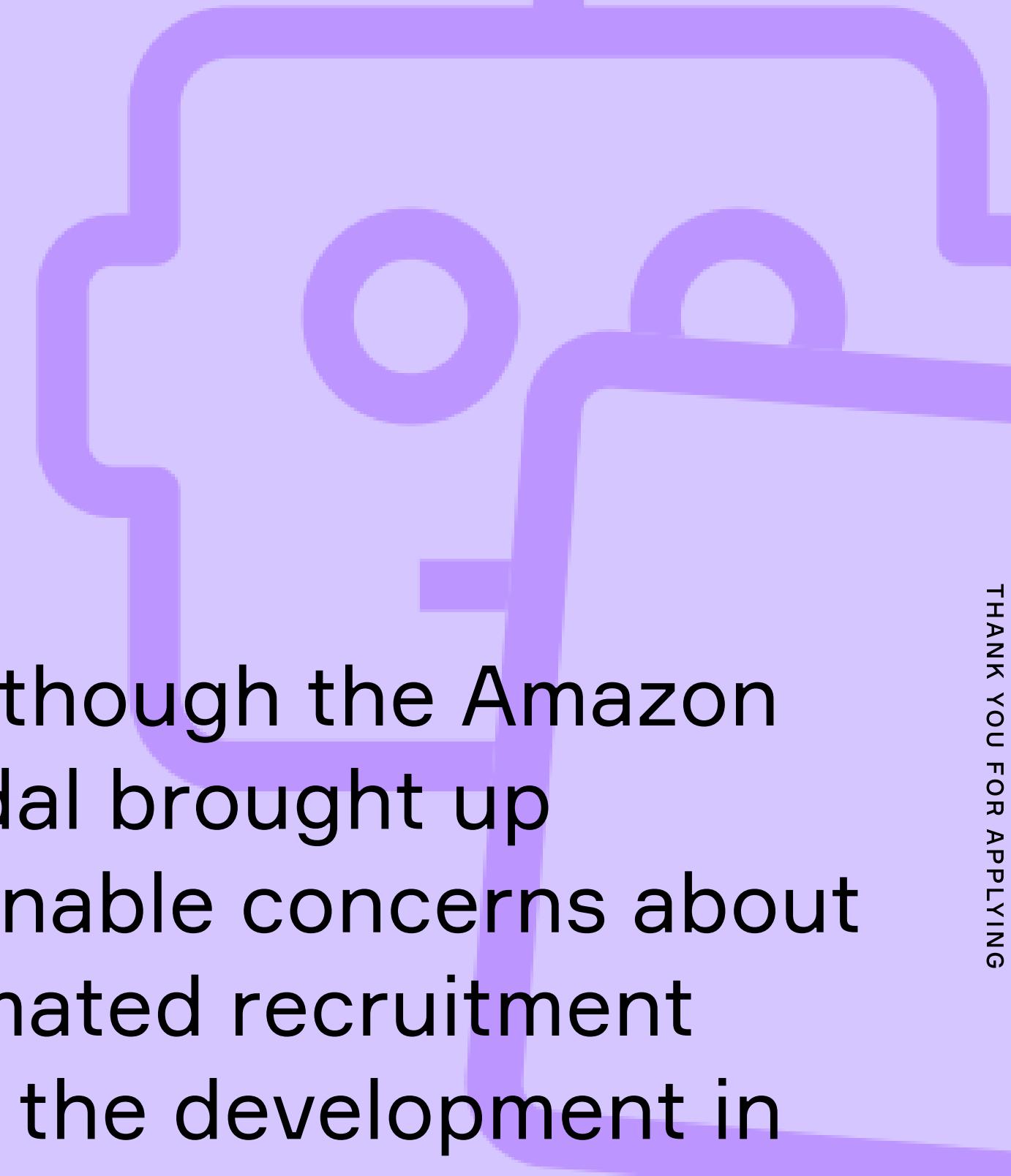
HR employees can only go through so many applications at a time, while high volumes of applicants could be processed quickly and effectively by an AI system.

What is Automated recruitment?

Entelo –a SaaS* company, defines recruiting automation as a category of technology that allows companies to automate recruiting tasks and workflows so they can increase recruiter productivity, accelerate time-to-fill, reduce cost-per-hire and improve the overall talent profile of their organization.[29]

Employers who have been using digital technologies to optimize their recruitment processes and are now turning to a new form of automated workflow using AI powered recruitment software to further optimize each step of their hiring process.

AI-powered recruitment software can automatically determine who gets to see a job advertisement and assess job applicants or even predict a candidate's salary requirements.



Even though the Amazon scandal brought up reasonable concerns about automated recruitment tools, the development in this sector has not slowed down, and AI startups continue to flourish.

*Software as a Service

Problem Statement

Job applicants who are directly impacted by automated decisions do not get to understand, question or contest the results.

How then, might we raise awareness of the consequences of these flawed AI systems for jobseekers?

Research

Methods

We divided our research methods into two categories - Qualitative and quantitative. Qualitative being research on a micro scale - Understanding the fabric of our users' lives. While the quantitative research was concerned with the macroscopic view - Research on a bigger scale, identifying common pain points and patterns, social listening and online ethnography.

Quantitative

We started our process with desk research, to find out about current practices and emerging trends in Artificial Intelligence: Looking through peer reviewed papers, topical analysis of relevant online content, news features, conversations on social media pertaining to our issues. Census reports and other public datasets*, statistics of job seekers in different countries and other open source public records of employees.

*Datasets were harder to obtain in the EU owing to stricter data protection rules, however we found a few public datasets on the Los Angeles Municipality website and several others on Kaggle behind hefty paywalls.

Medium scale mapping and bricolage* helped bring our findings together.



Much of our research has been informed from credible online sources as well as peer-reviewed journals and books.

As the AI field is an incredibly fast-moving area, we have found online sources to be much more up-to-date compared to older publications, as new information keeps coming to light.

Qualitative.

After gaining an initial understanding, we approached experts with diverse competences for a broader perspective.

We then conducted semi-structured interviews with the experts to get a better overview.

Researchers from SINTEF and Simula shared their academic perspectives on Artificial Intelligence, while Industry experts from AI companies and start-ups taught us how artificial intelligence was being used in digital products today.

Finally, we met with the technical experts —Machine Learning Engineers and Developers— who build and deploy these systems, to discuss possible material explorations and the practical feasibility of our intent

We also conducted a user survey to

- see how jobseekers feel about certain topics,
- test our own assumptions.

The screenshot shows a Typeform survey titled "Your experience with applying for jobs online". The interface includes tabs for CREATE, CONNECT, SHARE, and RESULTS, with the RESULTS tab selected. The survey consists of several questions:

- Question 1: A little survey.. (22% response)
- Question 2: Thanks for taking time out to tell us more about your experiences. For all questions, press the 'V' arrow on the b... (7% response)
- Question 3: Let's start by finding out how online employment savvy you are... (2% response)
- Question 4a: How often do you use job boards online to look for new vacancies? (1% response)
- Question 4b: What job listing boards, if any, do you usually use? (for examples, Finn.no, Randstad, Adecco, Manpower, Linked... (6% response)
- Question 5c: When did you last apply for a job online? (0% response)
- Question 6: Alright. So, let's hear your thoughts about applying for jobs. (0% response)
- Question 7a: How do you usually find out about new jobs? (0% response)

PHOTO: Typeform Survey Screenshot

Expert Interviews



Researchers

Sagar Sen - SIMULA
Data Scientist + Medical Researcher

Signe Riemer Sorensen - SINTEF
AI Scientist, Cybernetics, AI ethics

Asun St. Clair - DNV
AI Ethics/Philosopher

Nikki Stevens - ARIZONA STATE UNIVERSITY
AI ethics/Software Engineer/P.HD

Industry Experts

Michael Skovsgaard - Founder
AI startup in Recruitment, Whaii

Kathinka Haraldson - Accenture,
Human Resources

Tuva Lunde Smestad - Fjord
Designing with AI

Palak Bisen - Bakken & Baeck,
Recruiter

Technical Experts

Kristina Simakova - Consultant
Software Engineer, Data Visualization

Audun Øygard - Schibsted,
ML Engineer, Artist

Ning Zhou - Microsoft,
Product Manager, ML engineer

Findings

Our key findings across 4 key areas are summarized below.

In the following pages, we will take you through a more detailed breakdown.

Bias

- Bias in datasets occur due to historical data.
- Algorithms hunt for winning formulas.
- Different human biases are often replicated by AI systems.
- Despite risk awareness, AI systems in recruitment are here to stay.

Industry Practices

- Companies aware of risks but unwilling to compromise on growth.
- Big tech funded research for ethical guidelines minimizes their liability.

Industry Standards

- Broad range of methods and AI tools used to automatically assess job applicants.
- Screening resumes is the most common practice.
- Evaluation criteria easy to comprehend but rarely communicated to applicants.

Awareness & Understanding

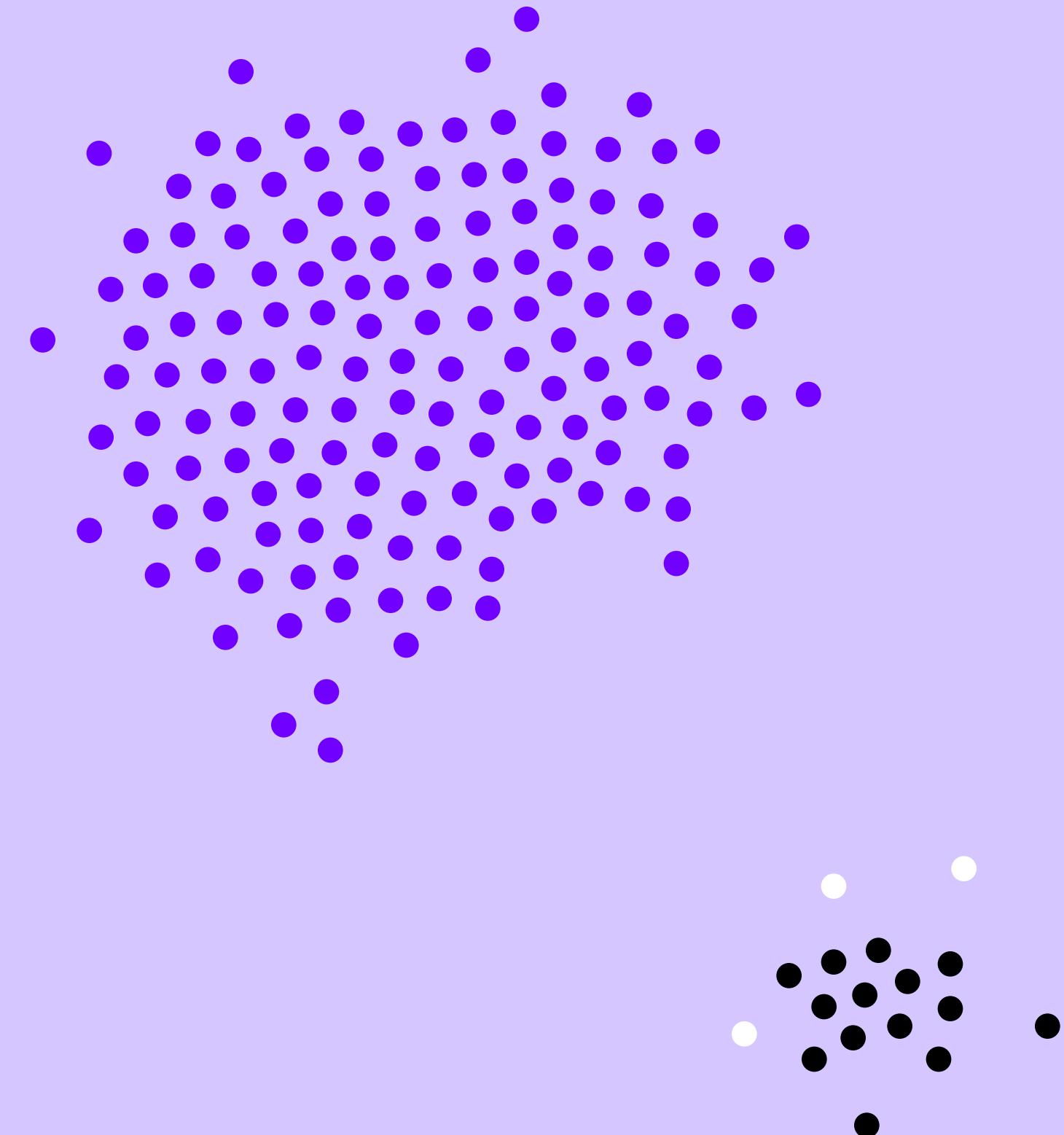
- Algorithmic decision-making treated as a black box
- Current tools to detect bias primarily for experts.
- No active initiatives to educate job seekers
- Job seekers largely unaware of automated processes in Hiring

Bias

We wanted to find out why algorithms turn out biased and discriminatory towards certain user groups.

“Can we teach machines to understand meaningful and complex concepts? What happens when machines are used to identify problems AND solutions, or to discard something or somebody as the past, and to identify and privilege somebody or something else as the future?” [31]

Sebastian Schmieg, Artist and Researcher



A triple inquiry

To consider the complete extent of bias in Automated Recruitment, we looked at:

- 1.Bias in society
- 2.Bias in technology
- 3.Bias in industry

'A preference for like individuals is a common human trait, and is likely to extend to other areas like hiring, grant funding and promotions. "It's a hard thing to fight because you are comfortable working with people who are like you," says Patricia M Knezek, chair of the committee on the status of women in astronomy, American Astronomical Society.'[34]

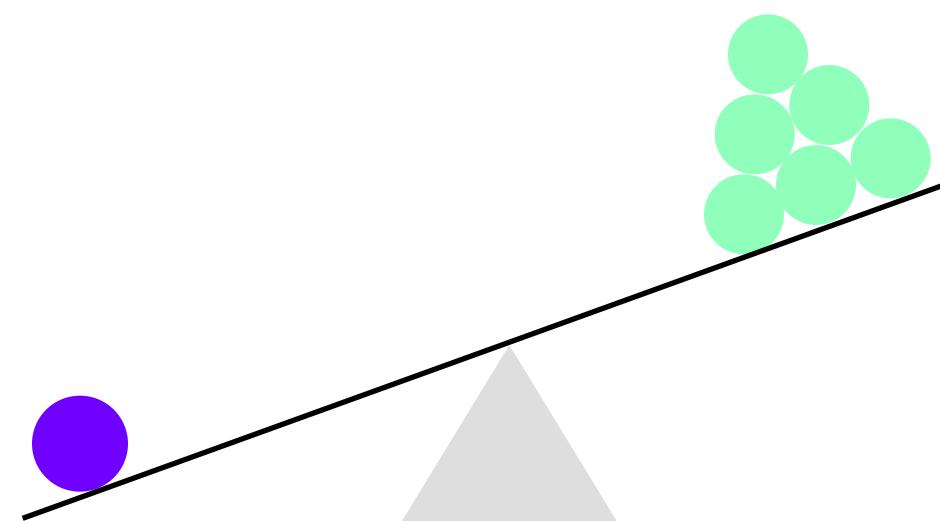
Human biases can be both conscious and unconscious and negative or positive, usually with negative biases dominating societal discourse.

The most widely recommended approach for people to counter their own biases is through awareness, openness to multiple viewpoints, and constant self-reflection. External mechanisms that gently nudge our behaviour in the right direction are also feasible alternatives.

1. Bias in society

"Algorithmic biases originate in or mirror human cognitive biases in many ways. In order to understand algorithmic biases, we need to understand human biases first." [32]

The Oxford dictionary defines Bias as a strong feeling in favour of or against one group of people, or one side in an argument, often not based on fair judgement. [33]



2. Bias in Industry

Discriminatory employment practices have plagued the recruitment industry for decades. Traditional modes of evaluation such as face-to-face interviews and sifting through resumes, can be “poor predictors of a candidate’s performance and heavily affected by a number of biases about a candidate’s ethnicity, name, and gender”[35]

There is a popular tendency to attempt to solve societal problems with technology, arguing for its relative neutrality.

These biases are not caused by direct intervention from artificial intelligence without human oversight. Instead, services with machine learning algorithms at their core have clear rewards for what kind of data or combination of attributes is deemed 'desirable'. As a consequence, these judgments shape what is acceptable.

We can therefore conclude that technology tends to cloak the bias problematics, making it more difficult to trace the roots of the problem.

One of the other ways human biases are transferred to machines is during the data preparation process, when data is being ‘collected, labelled and cleaned’ [36] An example of this is when images are categorised problematically for machine vision algorithms.



Lil Uzi Hurt at Home
@lostblackboy



No matter what kind of image I upload, ImageNet Roulette, which categorizes people based on an AI that knows 2500 tags, only sees me as Black, Black African, Negroid or Negro.

Some of the other possible tags, for example, are “Doctor,” “Parent” or “Handsome.”



♡ 509 · 2:08 AM - Sep 18, 2019 · Brooklyn, NY



[37]

184 people are talking about this



ImageNet Roulette [38] was launched by the artist Trevor Paglen and the AI researcher Kate Crawford

PHOTO: Screenshot from Twitter

3. Bias in technology

Using human-built technologies, poses the risk of our own biases being transferred to these systems.

'As **John Giannandrea** points out in **Will Knight's** article for MIT Technology Review, if we provide a machine learning algorithm with biased data, the outcome will be biased.'^[39]

AI systems are predisposed toward measuring only the values that have been pre-fed into them. Uncovering hidden bias in data is paramount to ensuring fairness for anyone being evaluated by an algorithm.^[40]

The 2 most commonly cited types of bias in data and machine learning are :

Confirmation bias – occurs when the person performing the data analysis wants to prove a predetermined assumption.

Selection bias – This occurs when data is selected subjectively resulting in unbalanced or non-representational data sets.

'The Amazon case' mentioned earlier in our research is an example of a selection bias. The tool's algorithm had been trained on Amazon's employee data from the past 10 years.

Consequently, Amazon's system taught itself that male candidates —who had historically earned more money— were likely to be more successful, and favoured them over women with the same qualifications.

Based on these findings, we were able to conclude that most AI products available in the recruitment market today suffer from one or both of these biases.

Key Takeaways

1. Throughout our study, we found that in many cases trained AI models favour one user group over the other, but not because tech companies wilfully create biased algorithms.
2. The discrimination usually occurs due to our human biases being unconsciously transferred from the historic datasets that these models are trained on.
3. Predictions based on past hiring decisions and evaluations can both reveal and reproduce patterns of inequity at all stages of the hiring process, even when tools explicitly ignore race, gender, age, and other protected attributes.

Creating a perfectly balanced and unbiased dataset is practically impossible. With that in mind, one has to be cautious about the consequences of systems trained on those data sets.

Industry Practices

A popular AI startup claims “Pymetrics helps companies better understand their workforce while making better & fairer people decisions with behavioural science and ethical AI technology”^[41]

AI Ethics is a fairly new field which barely existed before 2017.

The discourse of “ethical AI” in the US* was aligned strategically with a Silicon Valley effort seeking to avoid legally enforceable restrictions of controversial technologies.^[42]

[The Intercept](#)

[43]



Historically, the EU has had a more cautious approach to the use of AI while the US appears to favor rapid development motivated by commercial gain, overriding ethical concerns.

[44]



The White House said, “Europe and our allies should avoid heavy handed innovation killing models.”^[45]

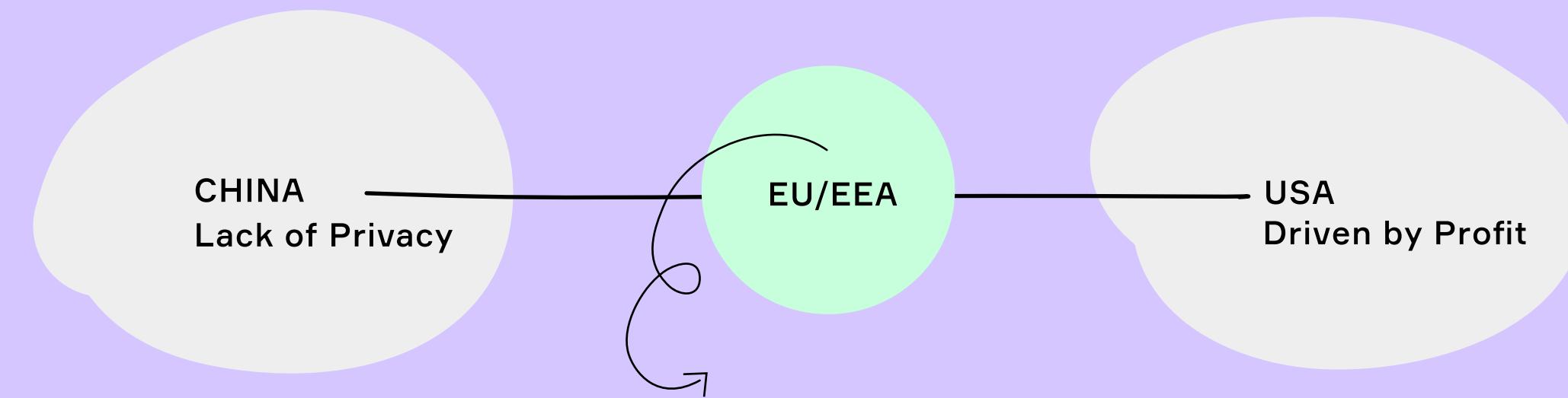
[Reuters](#)

However, startups in the EU that are built on US based big tech companies implicitly co-opt their ethics.

Unlike the private sector, the public sector has been slow to respond to the dangers of the unrestrained use of automation e.g in surveillance and military forces.

Although both the US and EU are currently working on new legislation to protect their citizens by formalizing a set of standards for its ethical use; the reality remains that there are still no clear rules in place regulating the use of AI systems, even as their use continues to grow.

*United States of America



“We want to be in the middle, our goals are much more clear”

Asun St. Clair,
AI Researcher/Philosopher



Facebook says it has a tool to detect bias in its artificial intelligence

[Quartz](#)

10/03/18



Microsoft Microsoft is creating an oracle for catching biased AI algorithms

[MIT Technology Review](#)

10/31/18



Pymetrics open-sources Audit AI, an algorithm bias detection tool

[VentureBeat](#)



Google Google Education Guide to Responsible AI Practices – Fairness

[Google](#)

10/09/18



Accenture Accenture wants to beat unfair AI with a professional toolkit

[TechCrunch](#)

[46]

Big tech companies developing AI products are well aware of the ethical risks involved. There is growing evidence that they finance academic research in order to develop their own ethical standards – often as a protective measure to bypass legal liability.

We can thus conclude that ethical principles for AI are being used to gain trust in their products

Key Takeaway

1. Big tech companies are aware of the risks but seem unwilling to compromise on commercial growth.
2. Currently, there is no third party auditor to ensure a common ethical standard.

Industry standards

To reiterate our key takeaway, despite being aware of the risks, it seems that adoption of AI systems in recruitment is here to stay.

We analysed numerous AI powered recruitment apps, tools and services that are currently in use and grouped them by type of input.

Resume Screening



+ web scraping

Chat Bots



Video



Tests and Games



We also mapped and categorized the different functions of these tools to understand how they worked:

Following our previous analysis of the AI tools, we discovered that an Automated Evaluation workflow usually goes through the four stages listed below.



Input

What the candidates apply with.

- CV / resumé / cover letter
- Form
- Game
- Tests
- Questionnaire
- Quiz
- Skill test e.g. typing
- Video pitch
- Chatbot

Analysis Method

How the material is processed.

- Sentiment analysis
- Voice analysis (intonation)
- Video analysis (body language, facial expressions)
- Analysing cognitive skills
- Analysing test result for personality traits

Evaluation

What the assessment method is.

- comparing keywords with job description
- comparing personality traits with company culture (according to HR staff)
- comparing candidate with successful employees (current or historically)

Output

What the evaluated results are.

- Ranking of candidates
- Matching candidates to best-fit roles
- Sending confirmations and status updates
- Answering basic candidate questions

Well known corporations and companies have implemented automated recruiting tools into their hiring processes. This is just a small selection of some of these companies:

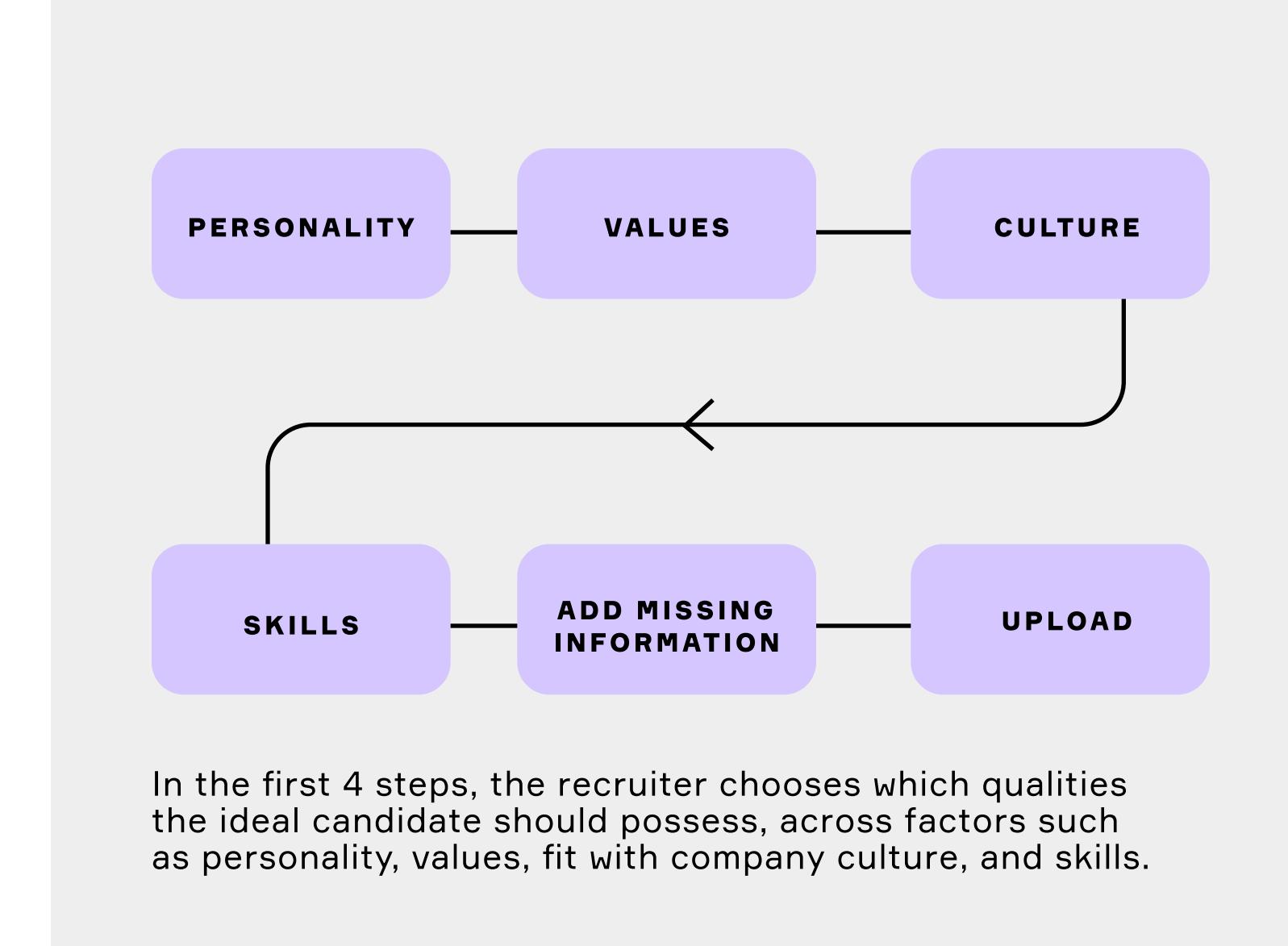
Unilever, Vodafone, MasterCard,
PayPal, Singapore Airlines, Intel,
Apple, Lyft, Target, Accenture,
Workday, KraftHeinz, McDonald's,
Hyatt, Staples, IKEA, Pandora,
Hudson, Bose, HBO, Nokia,...

We found that the most common way of screening candidates using AI recruiting tools is to analyse and evaluate their resume and therefore decided to concentrate our research on these resume-screening tools.

We reached out to Danish start-up **Whaii** and got a walk-through of their product, which helped us gain a deeper understanding of the inner workings of tools like these.

The co-founder **Michael** explained to us the prevalent AI technology behind most screening software, Natural Language Processing (NLP*) which is a subset of automated text analytics. It allows the screening tool to identify keywords in the resume and see if they match the company or recruiter's requirements.

In addition to this, by performing sentiment analysis, it is claimed that these tools can precisely identify one's soft skills on the basis of their choice of words.



In the first 4 steps, the recruiter chooses which qualities the ideal candidate should possess, across factors such as personality, values, fit with company culture, and skills.

Diagram: WHAII's proprietary AI evaluation process

Functionalities like the 'keyword match' as seen on resume screening tools seem far less sophisticated than we thought possible from a tool powered by Artificial Intelligence. The efficacy of these mechanisms are questionable and it remains to be seen if this is a suitable way of evaluating an applicant.

Therefore, we should be aware and critical of tools that subject job seekers to the judgement of these rudimentary algorithms.

*We take a more in-depth look at NLP later on, in our material exploration of Microsoft's Text Analytics AI tool, Azure

Our take* on the pros and cons of automated hiring systems

Pros

- Efficiency and Speed
- All candidates considered
- Ease workload of human recruiters
- Faster response time
- Financial benefits due to saved time
- Faster response time
- Common baseline evaluation criteria
- Ability to independently ignore or consider criteria

Cons

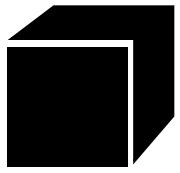
- Incomprehensible decision-making
- Lack of ability to manually intervene
- Perceived threat of being replaced by machines
- Algorithmic bias and discrimination
- Lack of control over how you present yourself
- Superficial or incomplete assessment
- Loss of human touch —emotions, non-verbal cues, body language etc.

*The points listed here are personal reflections based on our research.

Key Takeaways

- 1.** There are a broad range of methods used to automatically assess job applicants.
- 2.** The most common one is the screening of resumes.
- 3.** The criteria used to evaluate resumes is easy to comprehend but is rarely communicated clearly to the applicants.

Awareness and Understanding



“Blackboxing” is a term coined by Bruno Latour, meaning “the way scientific and technical work is made invisible by its own success”. [54]

Much of our world today is blackboxed. Technology in particular is rife with processes that we usually know nothing about, but communicate with, directly or indirectly, every day without question. The invisibility of these processes holds those who benefit from them in control.

“Secret scoring of individuals threatens rights that we have protected,” says Christine Bannan, consumer protection counsel at the Electronic Privacy Information Center, a non-profit research center that focuses on privacy issues.

She and her colleagues filed a complaint with the Federal Trade Commission last fall, alleging HireVue uses discriminatory practices. “It can take away real opportunities from people, without a way to know the basis to the decision or appeal it,” she said’ [55]

AI Fairness 360 - Demo

Data Check Mitigate Compare

Next

1. Choose sample data set

Bias occurs in data used to train a model. We have provided three sample datasets that you can use to explore bias checking and mitigation. Each dataset contains attributes that should be protected to avoid bias.

Compas (ProPublica recidivism)
Predict a criminal defendant's likelihood of reoffending.
Protected Attributes:
- **Sex**, privileged: **Female**, unprivileged: **Male**
- **Race**, privileged: **Caucasian**, unprivileged: **Not Caucasian**
[Learn more](#)

IBM's 360° fairness tool [56]

While looking at existing products and current research, we found that there is a great deal of awareness about the need for fairness and understanding of AI systems amongst tech experts.

Concerted efforts are already being made by 'software developers' to make their products fair and explainable.

However, most AI explainability tools available in the market today are developed for industry experts. Service recipients, who in our case are 'the job seekers', do not have the same technical expertise. Consequently, there is no opportunity for them to investigate if they are fairly treated.

Besides, most of the general public are not even aware that systems like these are in place:

'A parallel YouGov poll found that only 32% of people are aware AI is used for decision-making in general.' [57]

The Guardian

Key Takeaways

1. There is a critical knowledge gap for job seekers that are affected by automated recruitment systems.
2. No efforts are being made to educate them how they are being evaluated and they are usually left without an understanding of what they are exposed to.

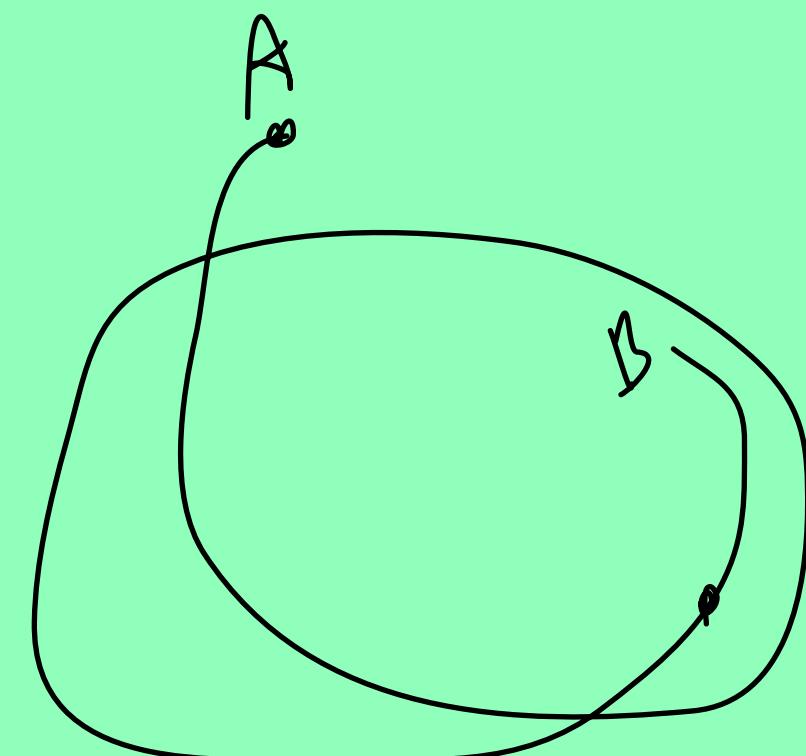
We asked ourselves:

How much understanding is needed?

What kind of information is meaningful?

Asking these questions helped us to frame the direction we wanted our project to take. We explore some possible answers later on in our process phase.

Approach.



Our Roles as Designers

The role of the designer has undergone a significant shift in the last decade.

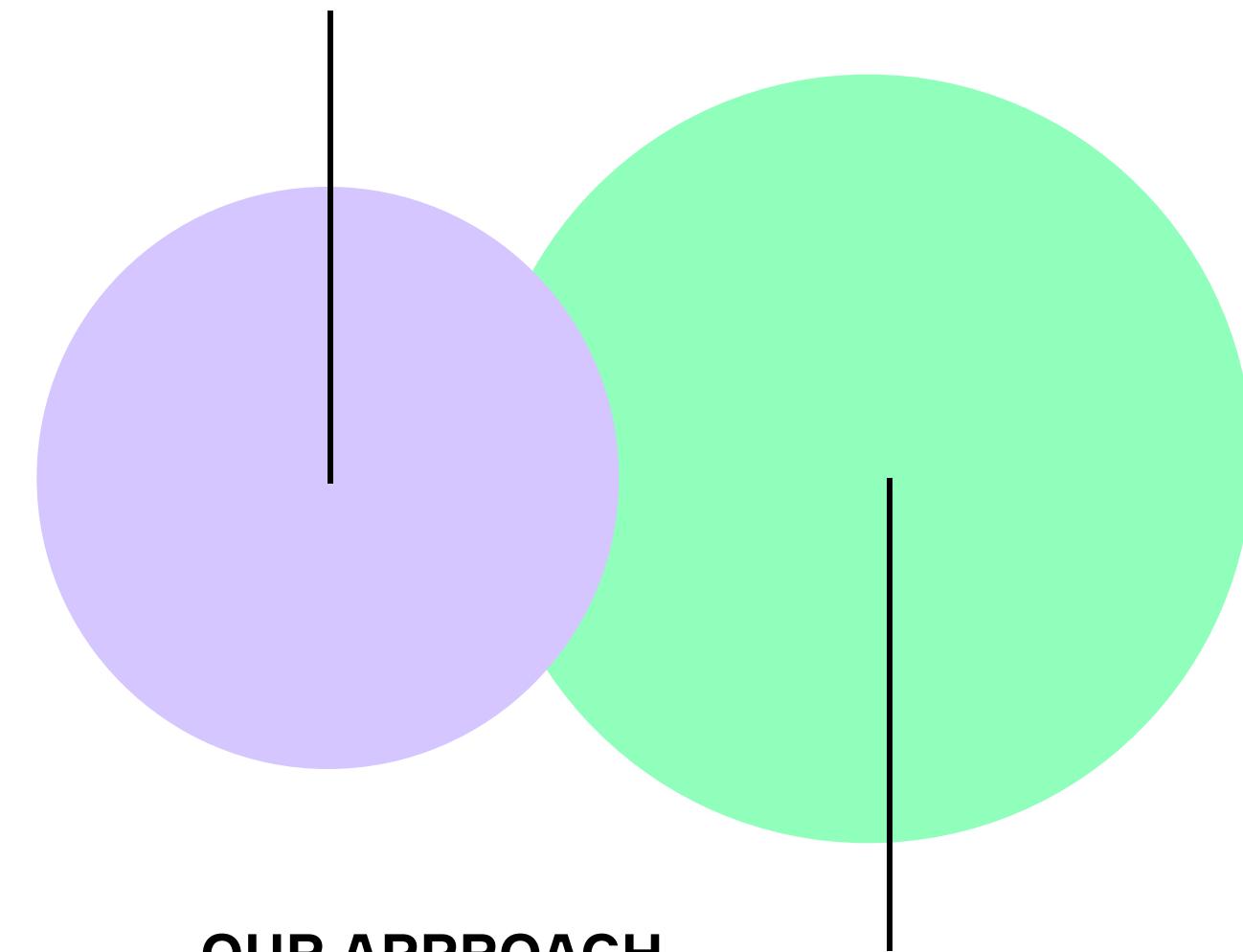
Designers as facilitators.

Using varied tools and design thinking methodologies, we empathize, understand, ask questions and build bridges of understanding.

We asked ourselves what we, as designers, could do to ensure that AI systems were demystified and made accountable.

TRADITIONAL

Pragmatic, problem-solving



OUR APPROACH

Design for better understanding, to raise the right questions and to make issues visible.

Our Roles as Designers

Could the answer take the shape of open dialogue, through shared insights and workshops, provoking debate – a public platform for critique?

NOTE: Although most digital products, including AI tools are designed with the user in mind, we found out that the end user has little say in the technology driving them and the ethics regulating their use.

Due to pressing relevance and complexity of topic, we perceived a growing need for making these ‘learnt machines’ aka AI, comprehensible for a larger audience.

Therefore, we made a conscious choice of educating ourselves and others through this project.

We also looked at the 5 rule suggestion¹ for incorporating AI technology into design as a guide:

Design for People
Design for Transparent Value
Design for Failure
Design for Learning
Design for Ethics

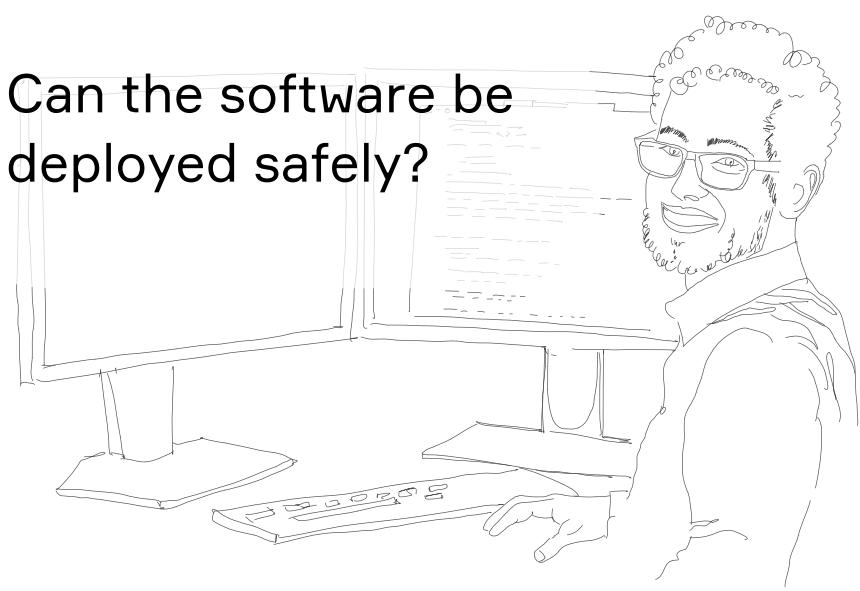
We owe a responsibility to the users we design for.

Framing Opportunity

Defining the Stakeholders

The people involved with or affected by AI tools can be categorized in three groups:

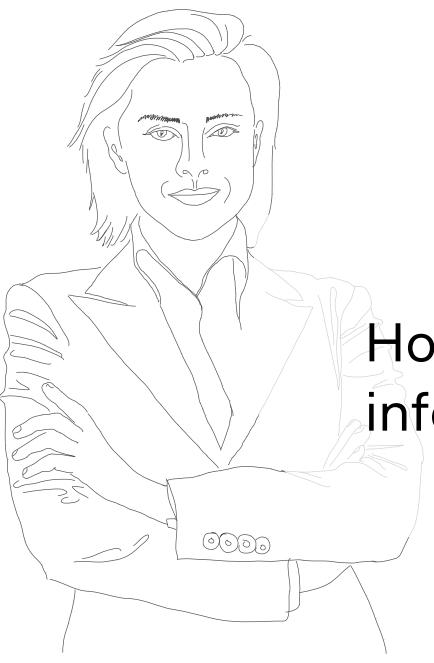
DEVELOPERS



Within Automated Recruitment, the category 'Developers' refers to those developing 'Recruitment Software' and selling it to hiring agencies and companies.

They are responsible for deploying reliable software that users can trust.

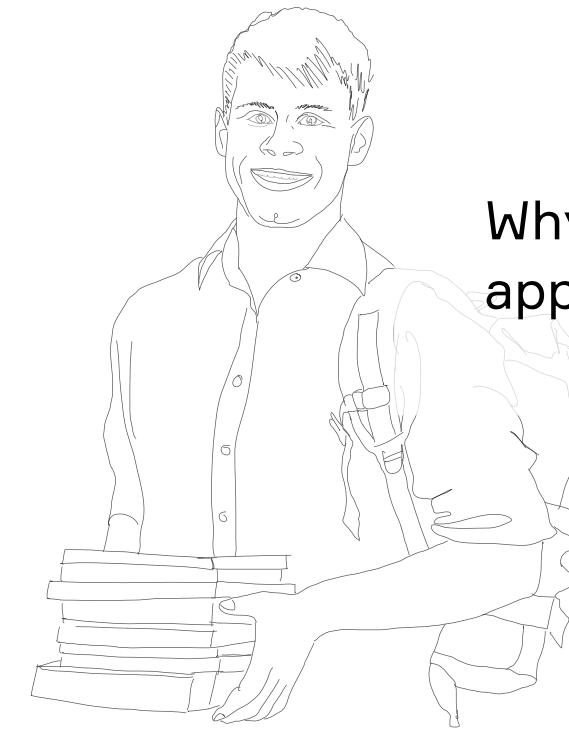
PROVIDERS



The service 'Providers' are the recruiters, who purchase the software and provide their services.

They need to assess the results made by the tools, and make the final decision.

RECEIVERS



The 'Receivers' are those applying for jobs and job seekers, directly affected by an automated decision.

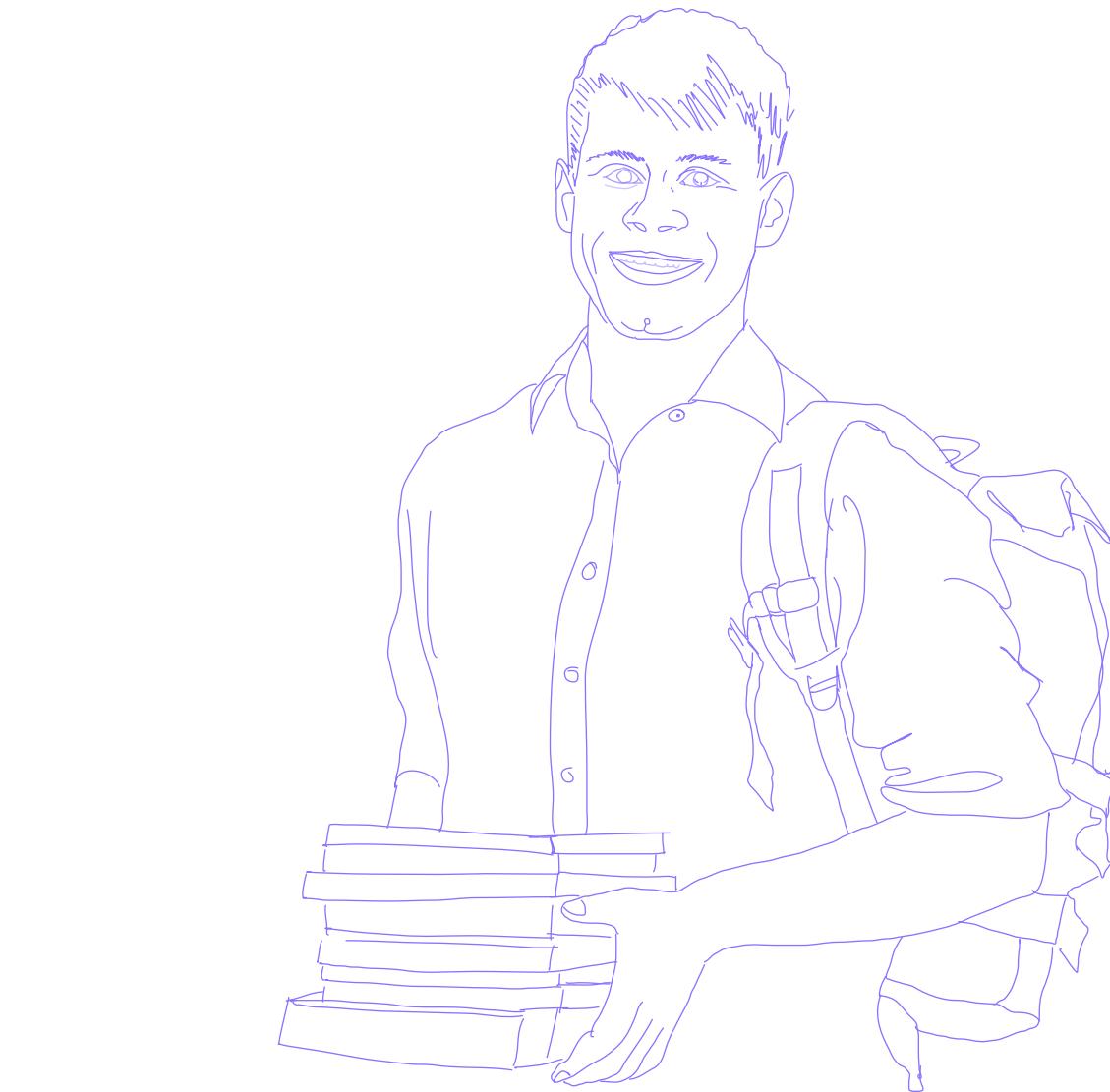
Most of them have no insight into the internal process. They need to understand the reasons behind an automated outcome.

Framing Opportunity

Defining our target segment

Current AI explainability efforts are primarily geared to benefit service providers, but not the receivers i.e ‘the job seekers’*, therefore we chose to concentrate on the latter as the target segment for our project.

*the basis for this assumption is further elaborated on with supporting images in our RESEARCH section ‘Awareness and Understanding’



It is also worth noting that we identified professional knowledge workers applying to large organizations (that receive hundreds of applications per job posting) as having the greatest need for explainability tools.

Our Intent

By making automated AI processes in recruitment more comprehensible to those without expertise, we intend to facilitate a more critical and conscientious way of engaging with these systems.

Our challenge

1. How might we empower jobseekers to question AI systems and their ethics of use?
2. How might we raise awareness and enable understanding of the consequences of automated recruitment?

We recognized the need for storytelling to immerse our target audience –quickly and easily– in our vision of the future of automated recruitment.

Strategy

By showcasing how digital interventions could disrupt the current practices, we aim to spark discourse and enable critical thinking about the subject.

Critical futures studies asserts that the present is fragile, merely the victory of one particular discourse, way of knowing, over another. The goal of critical research is to disturb present power relations through making our categories problematic and evoking other places, other scenarios of the future - *Inayatullah et al.* [52]

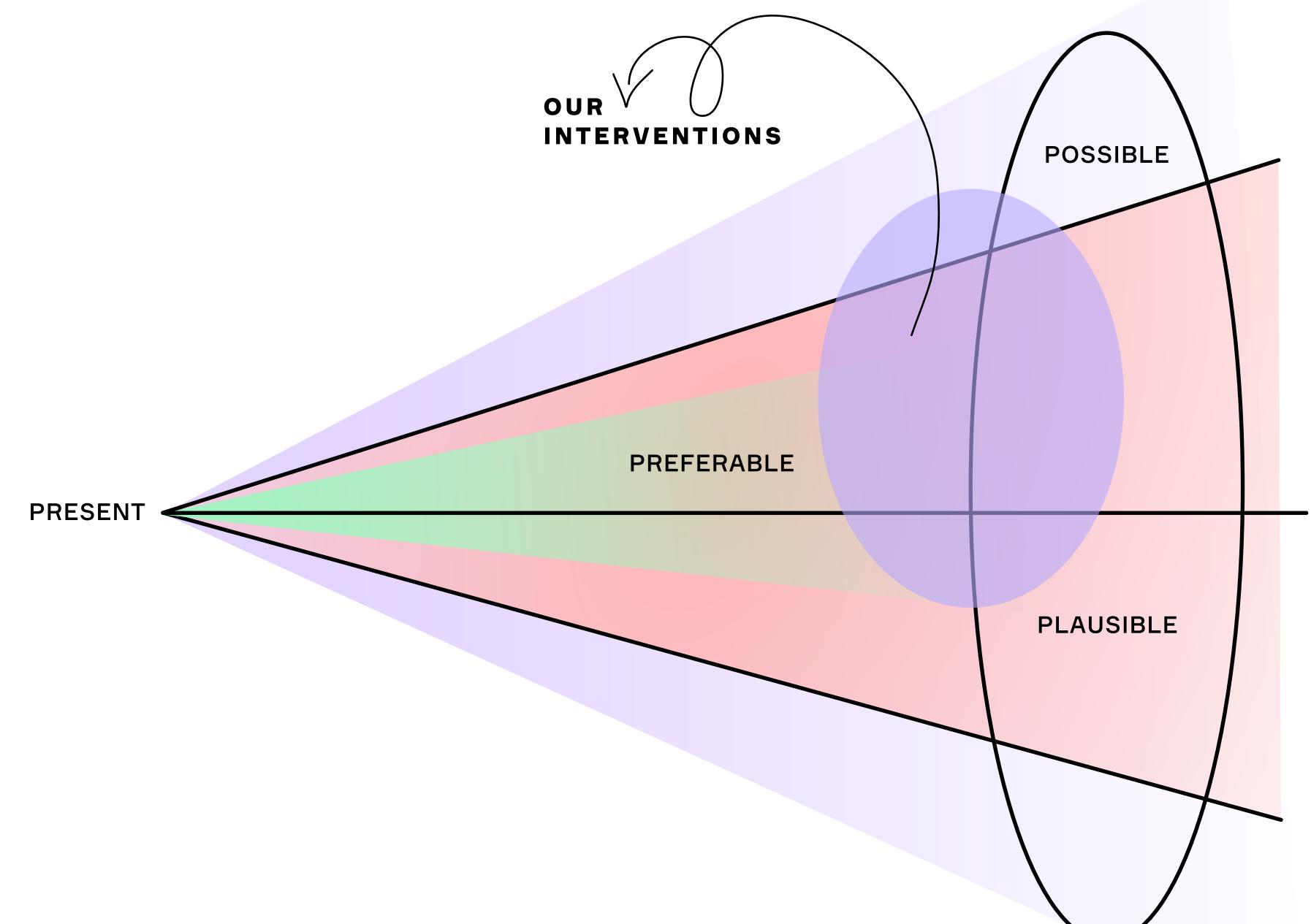
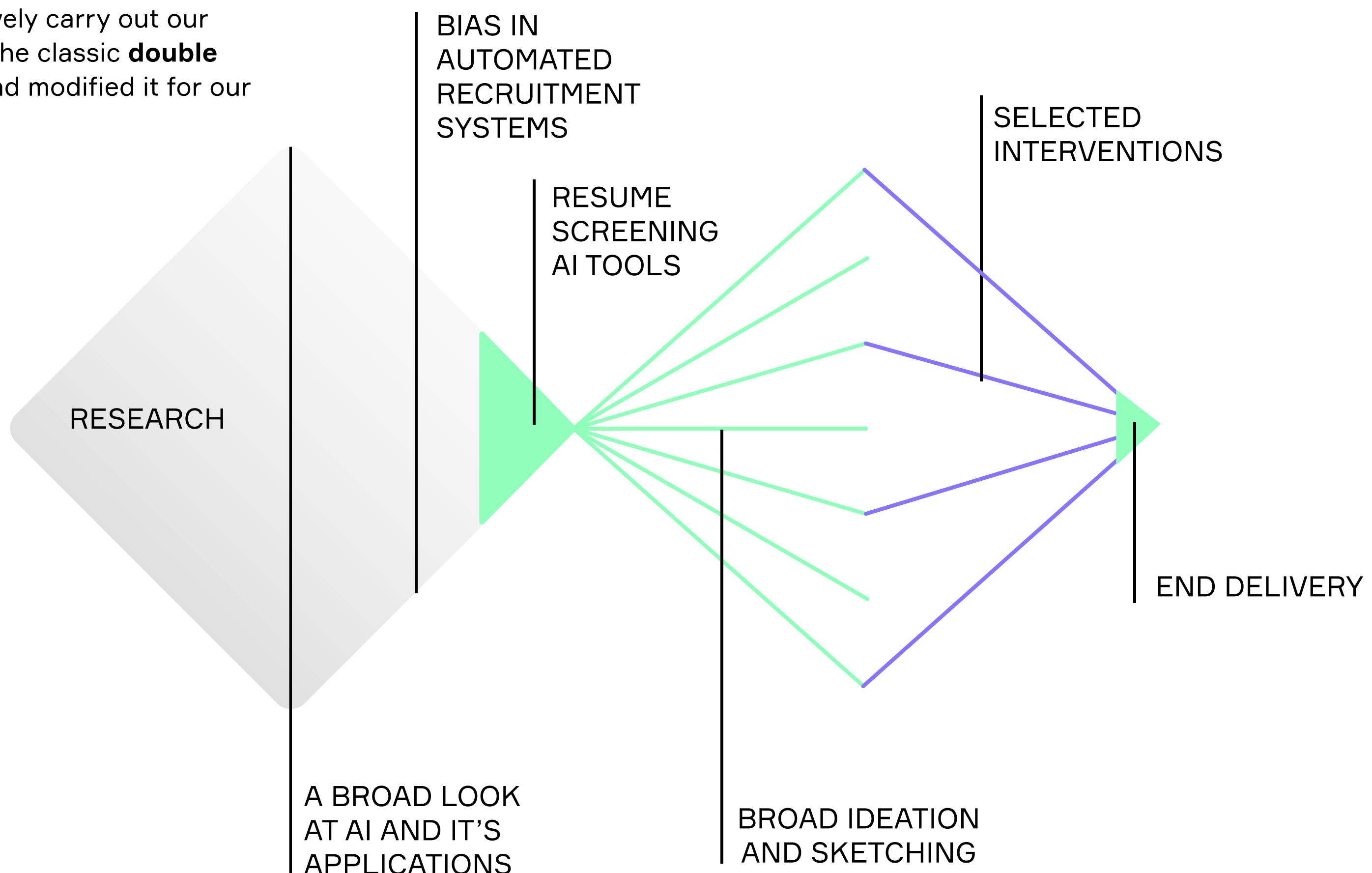


Diagram: Critical Futures

We mapped our area of design interventions on Dunne and Raby's cone of critical design possibilities. [53]

In order to effectively carry out our strategy, we took the classic **double diamond** model and modified it for our project.



A 'behind-the-scenes' look
at our process

Process.

Conceptualization

In addition to our main findings from our research, we gathered more hands-on, actionable insights by conducting a user survey.

Through our user survey, we were able to identify **key concerns** with the online hiring and application process.

General

- researching company background
- writing and filling out several forms
- customizing cover letters
- impersonal rejection emails
- lack of feedback

Automation Specific

- auto-summarized info that does not represent you accurately
- unusual or limited formats for text and image
- voluntarily handing over large amounts of personal data
- weird aptitude and personality tests with automated scoring systems

User survey

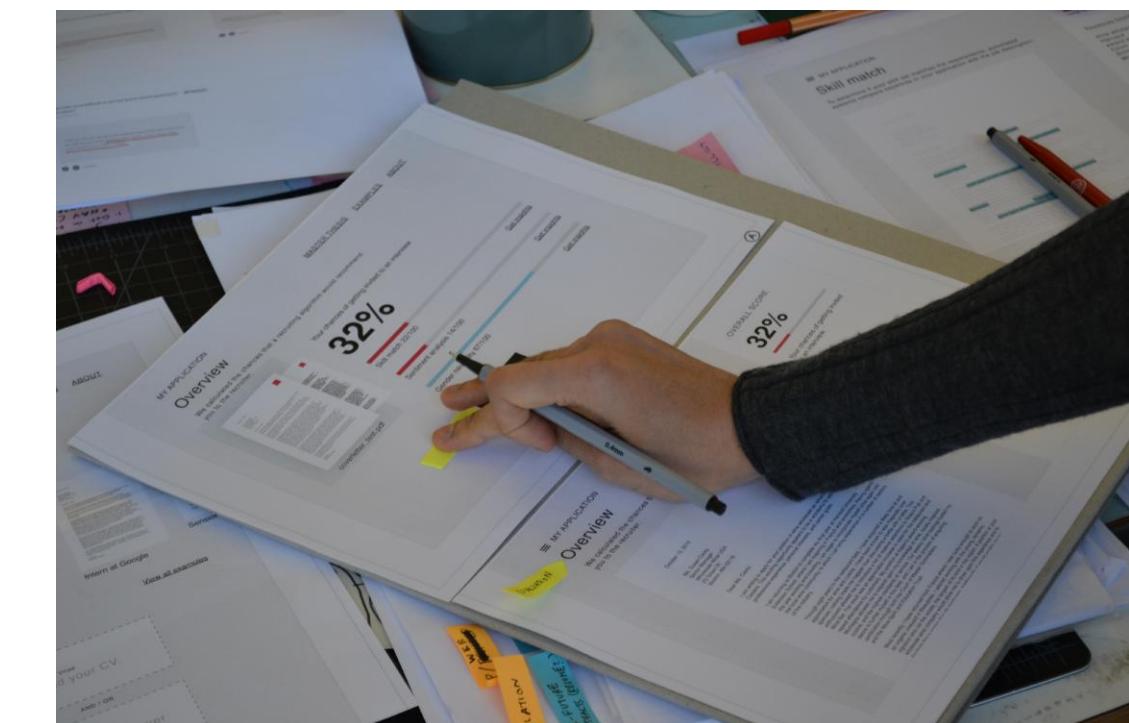
The image displays six screenshots from a user survey interface, likely from a platform like SurveyMonkey or Google Forms. The surveys are organized into two columns of three. Each screenshot shows a question, its response distribution, and a list of comments from respondents.

- Top Left:** Question 2b: "Have you ever received targeted ads for jobs online?" Response distribution: 72% Yes (18 responses), 20% No (5 responses), 8% Skip (2 responses). A comment: "All of the above - also the scary feeling of voluntarily handing over the immense amount of personal info to firms only to feel too desperate in the search for a job. Being in the lower age tier, I've obviously felt that online recruiting services aren't suited for people who are new to the job market." (3 months ago)
- Top Middle:** Question 2b: "What is the most difficult or annoying part about applying for jobs online?" Response distribution: 27 out of 31 people answered this question. A comment: "Not personal enough" (Collapse question)
- Top Right:** Question 2b: "What is the most difficult or annoying part about applying for jobs online?" Response distribution: 27 out of 31 people answered this question. A comment: "All of the above - also the scary feeling of voluntarily handing over the immense amount of personal info to firms only to feel too desperate in the search for a job. Being in the lower age tier, I've obviously felt that online recruiting services aren't suited for people who are new to the job market." (3 months ago)
- Middle Left:** Question 2b: "What is the most difficult or annoying part about applying for jobs online?" Response distribution: 27 out of 31 people answered this question. A comment: "One really annoying thing is that you usually don't get an answer back on emails if their not interested in you. So you go around hoping their answer." (3 months ago)
- Middle Middle:** Question 2b: "What is the most difficult or annoying part about applying for jobs online?" Response distribution: 27 out of 31 people answered this question. A comment: "Definitely the research about company background and write a different cover letter that reflects what they are looking for, so much admin, but at the same time you know you are putting extra effort to get better chances than an 1-click application." (3 months ago)
- Middle Right:** Question 2b: "What is the most difficult or annoying part about applying for jobs online?" Response distribution: 27 out of 31 people answered this question. A comment: "Too many different formats, filling forms, writing the same information twice, fatigue from repeatedly applying to multiple jobs at once." (3 months ago)
- Bottom Left:** Question 2b: "What is the most difficult or annoying part about applying for jobs online?" Response distribution: 27 out of 31 people answered this question. A comment: "If they receive it and what they think pf the application" (3 months ago)
- Bottom Middle:** Question 2b: "What is the most difficult or annoying part about applying for jobs online?" Response distribution: 27 out of 31 people answered this question. A comment: "They often focus on formal (hard values) qualifications instead of individual (soft values)" (3 months ago)
- Bottom Right:** Question 2b: "What is the most difficult or annoying part about applying for jobs online?" Response distribution: 27 out of 31 people answered this question. A comment: "Writing same information twice, never getting a response" (3 months ago)

Ideating and Sketching

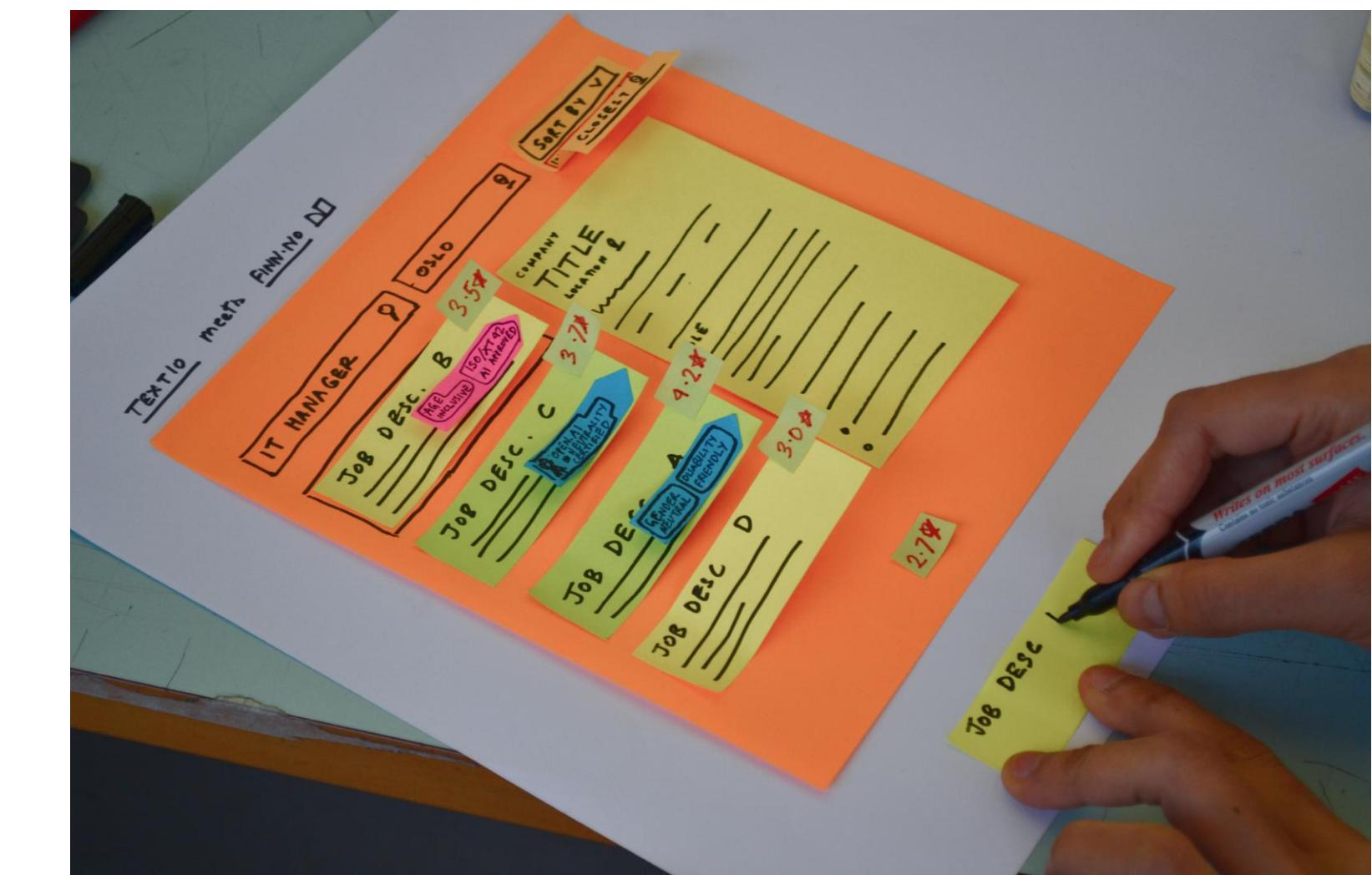
We started ideating about digital services that would empower the job seekers and raise awareness of automated hiring.

Throughout our concept phase, we kept continual dialogue with our experts. We discussed our first ideas with them using paper sketches and prototypes.





Based on their feedback, we were able to refine our concepts.



Material Exploration

To test our ideas for feasibility and to explore opportunities, we looked into AI tools to play around with.

Natural Language Processing

We looked at a popular NLP (Natural Language Processing) framework developed by Microsoft named **Azure Text Analytics** that powers other AI text analytics software.

The screenshot shows the Azure Text Analytics service page. At the top, there's a navigation bar with links to Home, Services, Cognitive Services, and Text Analytics. Below the navigation, the title 'Text Analytics' is displayed in large white font on a black background. A subtext explains it's an AI service for uncovering insights from unstructured text. A prominent blue button labeled 'Try Text Analytics >' is visible. At the bottom of the main content area, there's a navigation bar with links to Product overview, Features, Security, Pricing, Documentation, and More. Below this, a section titled 'Extract insights and relationships from text' is shown with a brief description of what it does.

Extract insights and relationships from text

Discover insights in unstructured text using natural language processing—no machine learning expertise required. Identify key phrases and entities such as people, places and organisations to understand common topics and trends. Gain a deeper understanding of customer opinions with

1. 'Named Entity Recognition' (NER)

is the ability to identify different entities in text and categorize them into pre-defined classes or types such as: person, location, event, product and organization.

This feature can also identify personal and sensitive information types such as: Phone number, Social Security Number, Email address, and bank account number.

Identifying these entities can help in classifying sensitive documents, and redacting personal information.'

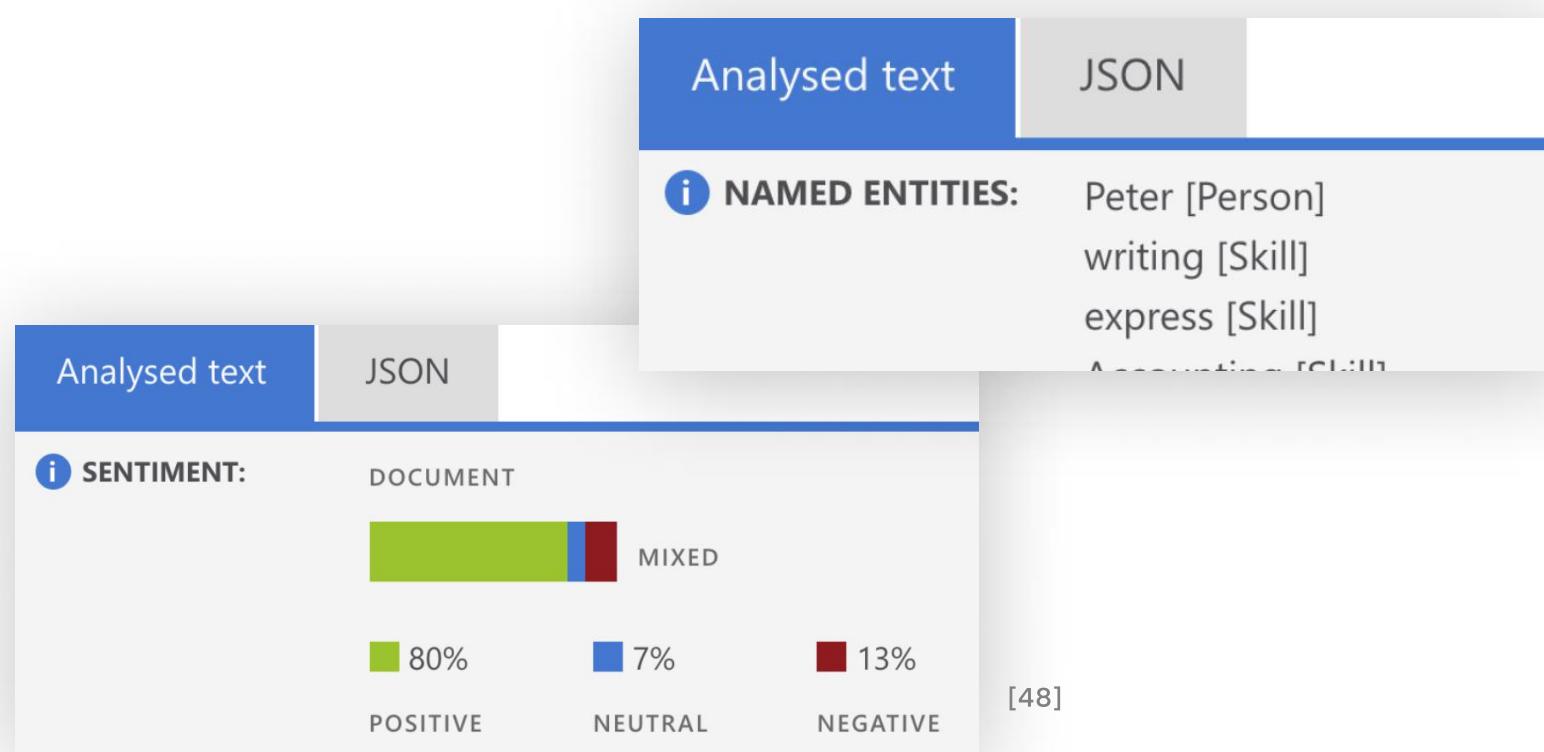
NER appears to be applicable for anonymization but may also find further use in identifying 'Skill' and to see what is considered or disregarded. It is possible that soft skills that a human may identify correctly could be omitted.

'Person type' type might help us understand how Azure's algorithm extracts a person's designation from a CV or cover letter. The Wikipedia powered entity linking for NER appears to be generic and therefore carries a risk of flawed correlation.

Data Visualization

2. Key Phrase Extraction (KPE)

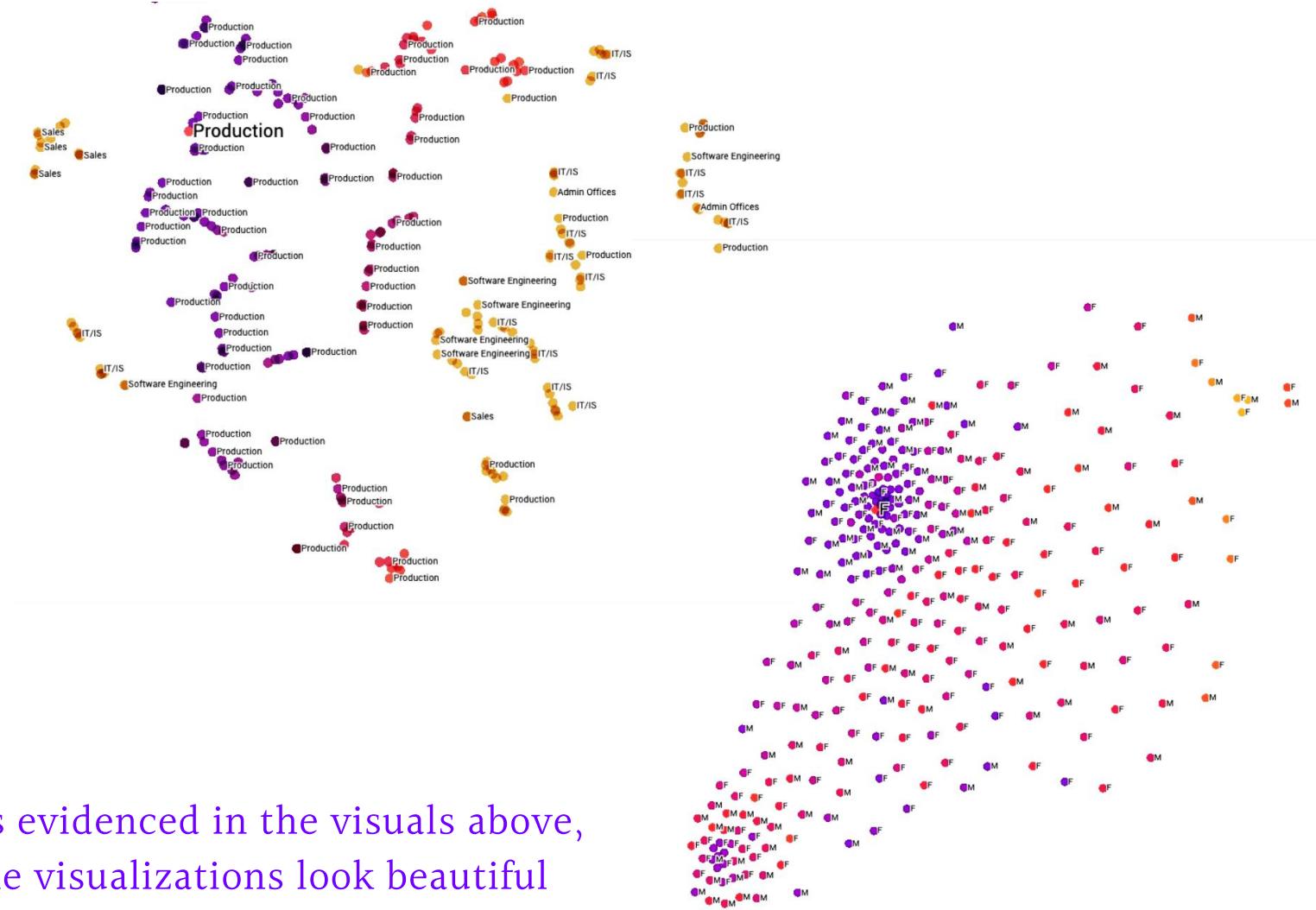
The most essential words as determined by Azure. Here the analyzer finds and discards non-essential words while keeping single terms or phrases that appear to be the subject or object of a sentence.



3. Sentiment Analysis

Each sentence is scored from 0-1 in decimal points, determining if the overall sentence sounds positive, negative or neutral.

We also tested 'TensorBoard Embedding Projector' - a tool that visually plots high dimensional data sets with thousands of data points. Using publicly available employee data sets, we explored how the algorithm might make sense of the data.



As evidenced in the visuals above, the visualizations look beautiful but are only comprehensible by experts, leaving the rest with the same lack of understanding that we originally set out to dispel.

PHOTO: Data Visualisations made by us

Collecting our ideas

To be able to compare our ideas, we created a template that summarized the key features of each idea.

concept title

C.V. Tune [Translation]

based on geography

sketch

OUTCOME
could be
reduced
bias.

- Where you are
- What you mean
(LOCAL CONTEXT)
- Who you are (personality)

C.V.TUNE IDEAS

- FIX THE TONE OF YOUR C.V TO FIT THE JOB

SENTIMENT ANALYSIS

ANONYMIZATION LEVELS

one-sentence pitch

Get an AI evaluation of your CV and fix it

keywords, features

- sentiment analysis
- tone of voice
- gender bias

users

1st time,
elder,
underrepresented
applicants

provider

3rd party
company,
non-profit

intent /
what does it solve?

bias check,
enables
understanding

STEP A
ANALYZE
CV
SIGN
DETAILS
CULTURE
CONTEXT
DETAILS

PERSONAL
DETAILS
ED
ACHIEVEMENTS

INTENT /
what does it solve?

bias check,
enables
understanding

PERSONAL
DETAILS
ED
ACHIEVEMENTS

concept title

Tweet your C.V.

IDEAS + SKETCHES

Idea 5

TWEET YOUR CV. (MACHINE READABLE CV'S OF THE FUTURE)

HUMAN

SOCIAL MEDIA + OTHER TRACKING
ALGO ALREADY
INTERACTS WITH A
SYNTHETIC VERSION
OF YOU [BASED ON
LIKES & S.M.H.]

one-sentence pitch

Condense your CV into a machine-readable tweet.

keywords, features

- discursive.
- design for transition

users

1st time applicants

provider

3rd party Company

intent / what does it solve?

question CV / Cover letter standards

non-profit

concept title

↑
→ META C.V.
LIVE CV, CV LI

sketch

CURRICULUM VITAE = COURSE OF LIFE

LIVING C.V.

IDEAS

EXPERIENCE

SKILLS

ACHIEVEMENT - LAST UPDATED 23/4/25

one-sentence pitch

Your CV updates continuously based on your actions. i.e.

keywords, features

- linked to your uni accounts

users

provider

private company
(google, ...)

intent / what does it solve?

questions, standards, makes application more convenient

job seekers

concept title	RECOBY. AI		
sketch			
one-sentence pitch	<p>chat with a bot to for get ISO ALGO-certified background for the job hunt. info on the company and its intentions.</p>		
keywords, features	<ul style="list-style-type: none"> - chatbot - ISO-standard 		
users	provider	intent / what does it solve?	
1st time job seeker, employer?	private gov. company e.g. ISO	<ul style="list-style-type: none"> lowering threshold 	

concept title

The inclusivity metric

sketch

one-sentence pitch

Ranking job ads based on a inclusivity score.

keywords

users provider intent / what does

underrepresented job seekers Finn.no align with value opportunity

abedapslassen making account

concept title
Feedback report

sketch

one-sentence pitch
Giving rejected candidates an explanation in the shape of a generated feedback report.

keywords, features
- visualization

users
rejected applicants

provider
hiring company, hiring platform (3rd party)

intent / what does it solve?
transparent hiring process

concept title
CV HEAT MAP

sketch

one-sentence pitch
Visually explaining how your CV is analyzed by AI.

keywords, features

users
job seekers

provider
non-profit org.

intent / what does it solve?
Enables understanding and awareness

① Enabling understanding
HUMAN | MACHINE

Some of our early ideas.

Live C.V. Information on most resumes get outdated after a while and need updating. This tool monitors your professional social media activities and adds them to a CV that continually updates your entire life

C.V Tune. A geolocation based semantic ‘CV tuning’ tool ala google translate that modifies your resume’s social approach and tone of voice based on the job location’s regional/cultural cues

Tweet your CV. An app that summarizes the most important keywords from your CV in 280 characters or less

The Feedback Report. A detailed breakdown of your application in case of an automated rejection

C.V HeatMap. A visual representation of what the machine prioritizes when screening your CV

CV Traceback. A service that allows you to trace which data sets the algorithms scanning your CV were trained on

The Inclusivity Metric. An ISO certified algorithmic rating standard for job boards and companies

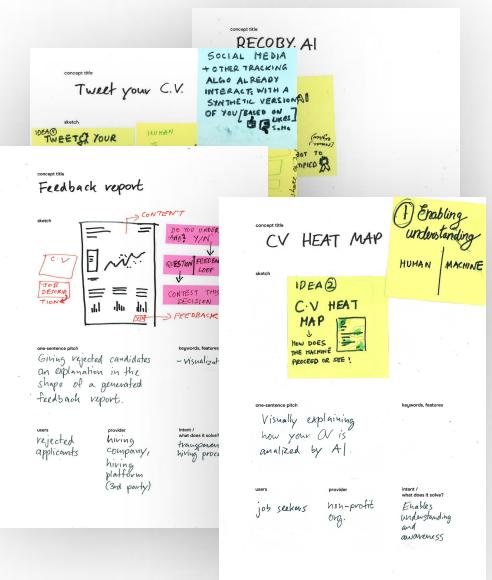
Recoby.ai A Chatbot to help applicants run a background check on the hiring company

C.V Anon. A service that lets you anonymize sensitive personal information that may lead to biased pre-selections

Evaluating our Ideas

The 2 Phases

After discussing our first set of sketches with the experts, we categorized our ideas in two phases.



Phase 1 **Enabling Understanding**

Immediate interventions that would serve as a direct response to current automation trends. Their purpose: to enable clear and direct understanding of ‘the automation mechanisms’ in hiring.



Phase 2 Disrupting Industry Standards

With our more speculative sketches, we considered the extreme consequences of these fictional ideas. What might lead to disruptions or changes in current recruitment practices and what might be the implications of such interruptions?

Both phases contain a small set of digital tools and services* –situated inside inter-connected narratives– to be used as conversation pieces to encourage critique from experts and non-experts. The services in the first phase would affect the services and use case of the second.

In order to structure these services further, we plotted them on a linear timeline spanning **the recent past**, **present day**, and **a possible tomorrow**.

*When we refer to ‘services’ in our concept, we primarily mean Software as a Service (SaaS)

Evaluation Criteria

We identified five main factors that were crucial to our aim. These factors have been used to evaluate each of our ideas, and to identify which parts to iterate.

Based on these criteria, we chose to refine the most promising ideas from each phase.

1. Purpose

Did the interventions enable understanding and/or disrupt current industry practices?

2. Plausibility

Were the mock-ups plausible? Building believable fictitious services helped us to create immersive scenarios. Over-simplification or technical infeasibility might have detracted from the experience.

3. Usability

How did our testers experience the prototype? While usability was not our primary objective, the flow of content and structure were important factors to consider relative to the other criteria, to complete the experience.

4. Understandability

Was it clear what the prototypes communicated? Effectively conveying our ideas and related impact would be an important basis for further discussion.

5. Discourse

Did our sketches function well as discussion tools? Provoking questions through the use of design fiction and digital props allows for a low threshold engagement with complexity and encourages reflection and critical thinking, which in turn helps to raise awareness.

Limitations

Although our intent was to help jobseekers, ironically due to restrictions placed under Covid we were unable to reach our user group in time, and decided to validate our ideas through a panel of experts and our supervisors instead .

However, we hope that the diversity of opinion and reflections that each of the panelists brought to the table resulted in a balanced evaluation.

Getting Feedback

In order to adapt to the pandemic enforced lockdown, we chose to collect all feedback remotely and online. Since we were unable to present and discuss our concept in person —via a workshop and discussion panel as originally planned—we created a living online document, in the form of a Dropbox paper, that would house our latest research and sketches.

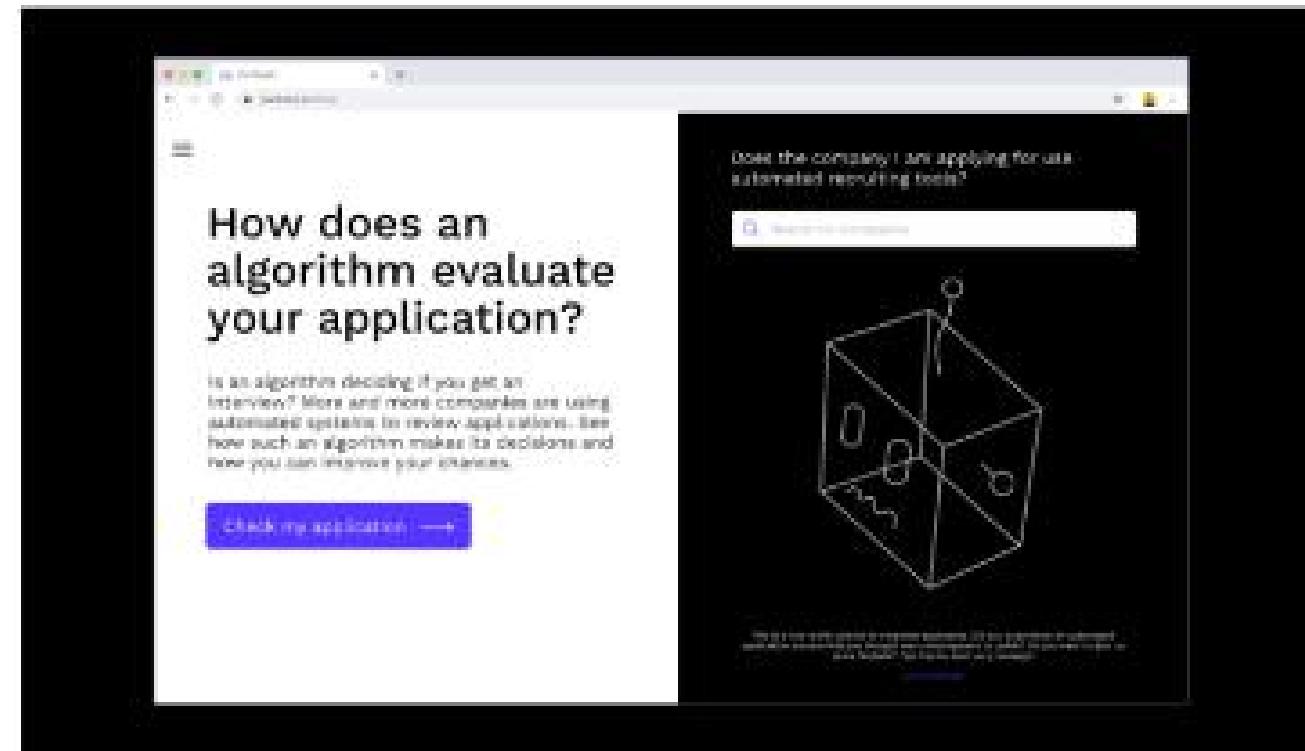
1—Enabling Understanding

💡 Human vs 🤖 Machine decision making

To judge, contest, or trust an automated decision, we need to understand how the decision was made. How can we enable applicants to understand the process behind an automated decision?

1A. CV Check

Who decides if you get selected for an interview? More and more companies use automated systems to review applications. Click below to understand how an algorithm evaluates your application. Can you improve your chances?



Try out the prototype below (approx 5 mins.)

Figma
Created with Figma
www.figma.com

Tell us about your experience with the prototype (approx 10 mins.)

CV Check - Feedback
5 questions about your experience with this prototype.
[docs.google.com](https://docs.google.com/spreadsheets/d/1oIzgkVXWQHJLjyfCwvOOGdPmKUuGZBzqMzYRzXnIc/edit#gid=0)

1B. The Feedback Report

After applicants have been rejected, they are often left wondering what led to the decision.

We invited a panel of experts to evaluate our project, first introducing our context and then engaging them with the concept through scenarios and clickable prototypes.

Application for Web developer at Company XY

Highlight experiences
Ranked by relevance for position

- Web developer at XYZ [edit](#)
- Web developer at ABC [edit](#)
- System architect at XYZ [edit](#)
- Internship at XYZ [edit](#)
- Internship at XYZ [edit](#)

[+ add experience](#)

Localized
Adapt the CV to country's practices and common ways of doing things.

Country: Norway [edit](#)

Language: Norwegian [edit](#)

Industry: Tech [edit](#)

Privacy
Decide which personal info you want to share with the company.

Name [edit](#)

Picture [edit](#)

Nationality [edit](#)

Date of Birth [edit](#)

Civil status [edit](#)

Your expectations
What do you expect from your next job?

Salary: 45.000 NOK/month [Include](#)

Job type: part-time [Include](#)

Personal Responsibility: No [Include](#)

Personalize
What makes you you?

Hobby: Boxing [Include](#)

Personal talents: Runs a blog about UI trends [Include](#)

Activity: Add something here [Include](#)

[View CV](#)

Transitioning from paper sketches to digital prototypes

This is how your Personas performed in the evaluation process.



John Smith
Male, American, 41 years

98



John Smith
Male, American, 41 years

92

Type something

A strong conceptual thinker who has a keen interest in all things related to the Internet. Jane has the ability and experience needed to design and execute complex software projects for a diverse variety of users. She is committed to having an impact on the future of any company that she works for, and possesses the enthusiasm and commitment to learn and develop her career within a fast paced and growing business. She has a track record of building fluid and dynamic interfaces that are userfriendly, and which positively impact on people's lives.

Professional Experience

Scottie Tech Company, Seattle, WA
FRONT-END WEB DEVELOPER (February 2013 – Present)

Responsible for working on a range of projects, designing appealing websites and interacting on a daily basis with graphic designers, back-end developers and marketers.

- Developing and maintaining the front end functionality of websites.
- Participating in discussions with clients to clarify what they want.
- Conducting cross-browser testing with XHTML, CSS & JavaScript.
- Contacting external webmasters to confirm link placements.
- Provide guidance to other team members on web development issues.
- Devising SEO strategies based around specific keywords.

Malcolm Technology Seattle, WA
FRONT-END WEB DEVELOPER (June 2008 – February 2013)

Worked as part of a multi-disciplinary team, carrying out ad-hoc tasks as requested by the IT Manager. Had a specific brief to ensure the websites build for customer's precisely matched their requirements.

- Performed maintenance and updates to existing client Web sites.
- Involved in creating a comparison site from scratch.

Remove traces of bias-prone attributes.

Anonymize gender

- She is → I am
- she works → I am working
- her → my
- She has → I have
- participating → engaging
- conducting → performing

Anonymize age

- February 2013 – Present → 7 years
- June 2008 – February 2013 → 5 years

9:41 9:41 omoka.io

Web Developer at Omoka Application Feedback Report

Your results

Skills 67 %	Requirement
Average 72 %	
Education 100 %	
Average 92 %	
Experience 59 %	
Average 82 %	

We are sorry to inform you that you have not been selected for an interview for this position. To help you understand the application result, we are trying to give an insight into our evaluation process.

What what missing for us?

Skills

- HTML
- CSS
- JavaScript
- TypeScript
- NodeJS
- React

In our job description, we asked for a specific skill set. You were lacking **2 out of the 6** required technical skills.

Experience

Your experience 3 years	Requirement
Average 5.2 years	

In our job description, we asked for more than **4 years** of experience in the field. Unfortunately, you only had 3 years.

How can I improve my chances?

- using pattern libraries
- reactive programming principles
- end to end product development

You did not mention that you had expertise in these fields. Including them in your CV will increase your chances for a job as a web developer.

Was this helpful?

[Yes](#) [No](#)

We hope that our insights will help you with your next application. You got even more questions now?

[Contact us](#)

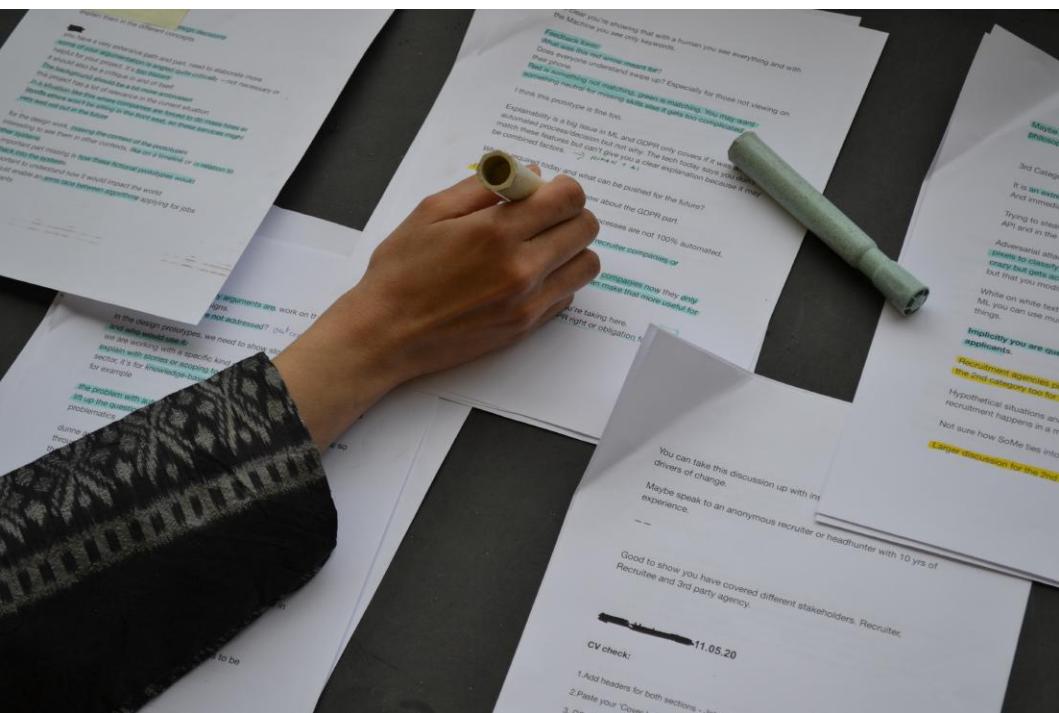
Individual responses were collected by answering questions on an online form, or a one-on-one zoom call.

Incognito CV - Feedback
5 questions about your experience with this prototype.

What do you think you can do on this website/ in this app?
Short answer text

What was difficult to understand, if anything? (e.g. navigation, copy text or overall purpose)
Short answer text

Did the product seem plausible? If not, why?
Short answer text



The panel of experts were chosen based on their expertise in cross-disciplinary sectors:

HR/Recruitment

Palak Bisan - Baekken & Baeck
Kathinka Haraldson - Accenture

Technology

Audun Mathias Øygard (AI)
Ning Zhou (data scientist) - Microsoft

Design

Amalie (Designer) - Blank
Aida (Designer) - Blank

Ethics

Caterina Forno (Designer/Ethics in design) - EGGS

We also spoke to two recent job seekers to get their points of view:

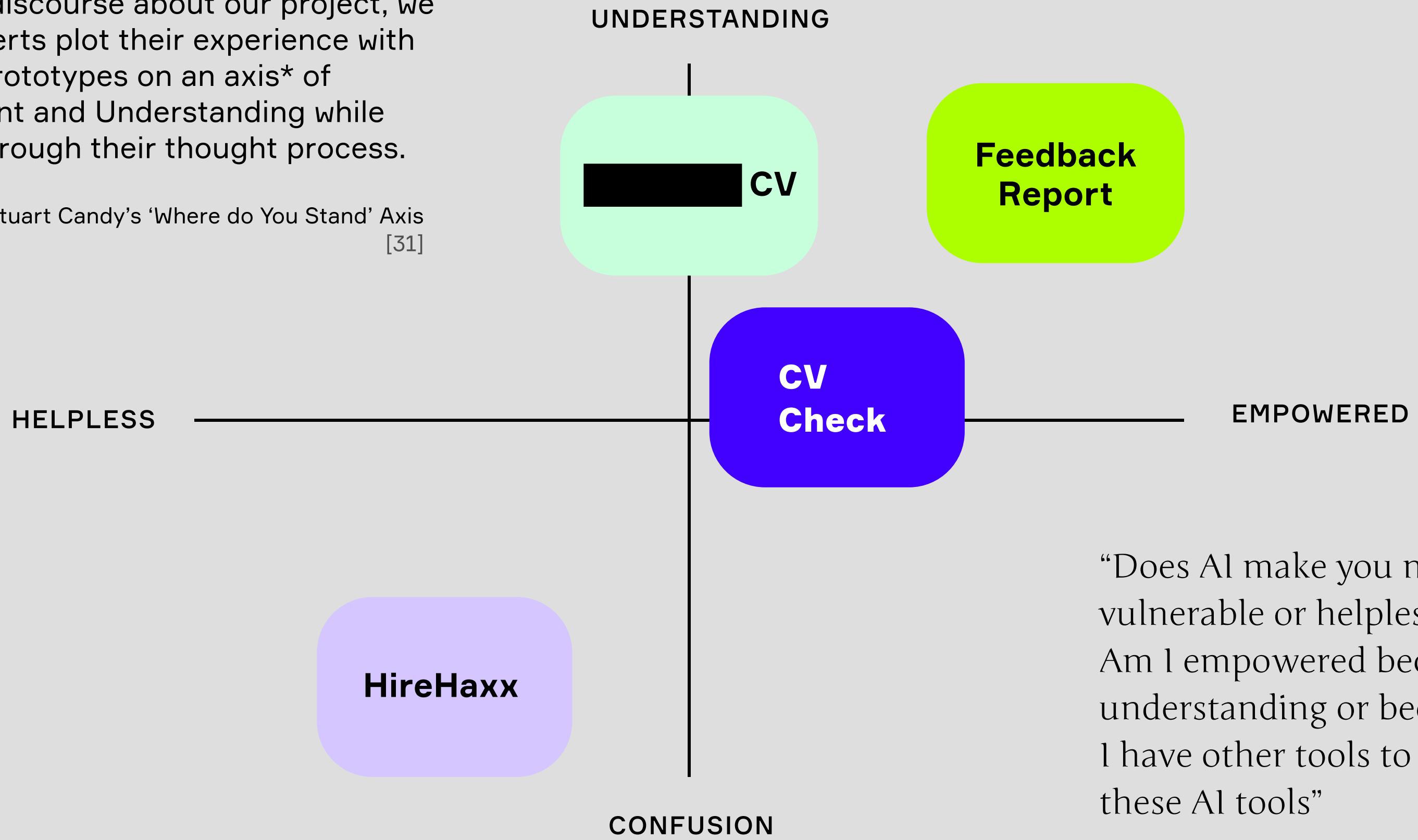
Job Seeker

Inexperienced Job Seeker - (24-34)
Experienced Job seeker - (35-55)

Experience plotting

To provoke discourse about our project, we had the experts plot their experience with the digital prototypes on an axis* of Empowerment and Understanding while talking us through their thought process.

*Inspired by Stuart Candy's 'Where do You Stand' Axis [31]



“Does AI make you more vulnerable or helpless?
Am I empowered because of understanding or because I have other tools to battle these AI tools”

Jobseeker

Prototyping the Interventions

The four chosen interventions were sketched out, tested and improved based on feedback from a panel of experts.

In order to give you a detailed insight into our iteration process, we explain each intervention in these five stages below:

1. Context
2. Concept
3. Execution
4. Feedback
5. Reflections

Our reflections on the possible consequences of each intervention are woven into the scenario endings in our final delivery. (The scenarios themselves can be found in the next section titled 'Interventions'.)

1. “We regret to inform you...”

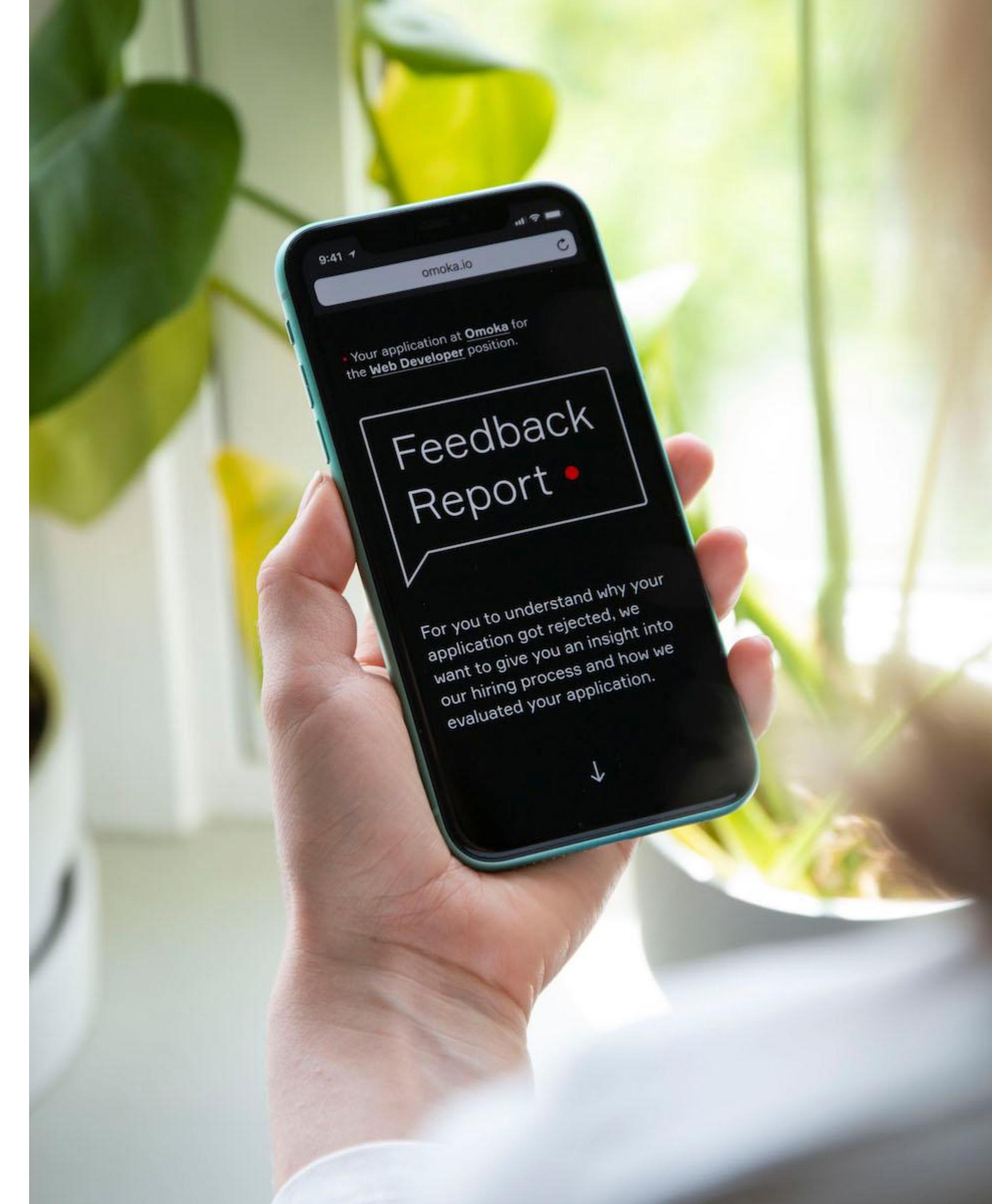
Context

While automated hiring tools rarely make affirmative hiring decisions, they often automate rejections. Much of this activity happens early in the hiring process, when candidates are deemed by a predictive system not to meet the minimum desired qualifications needed to move further in the application process.

When an applicant is rejected, they are often left wondering what contributed to the decision or left hanging with a stock rejection email. However, GDPR gives everyone the ‘right to an explanation’ if that decision was made by an automated process, i.e made without human intervention.

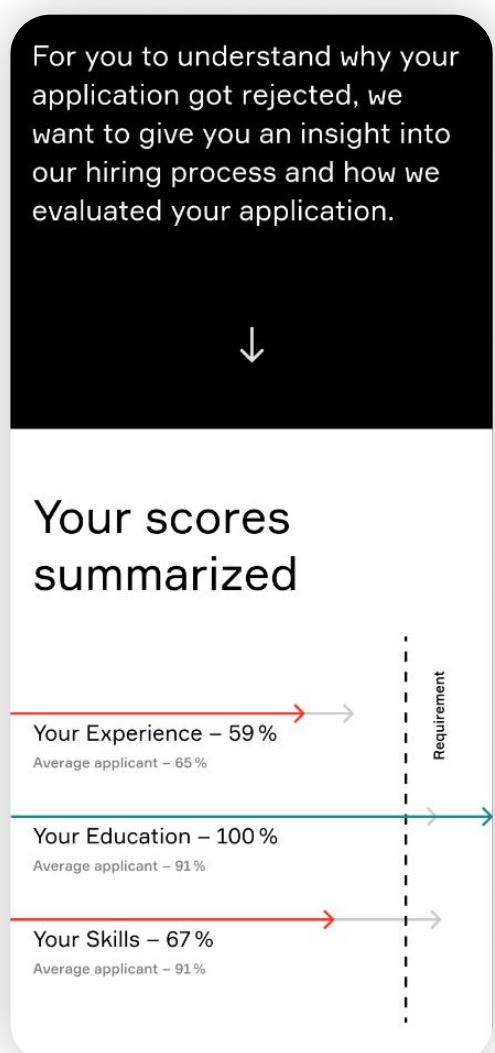
Concept

We imagined how such an explanation could look like, in the form of a ‘Feedback Report’. In practice, the report would be generated automatically and attached to the rejection e-mail. The report is intended to help job seekers understand the cause for rejection and how the evaluation process works.

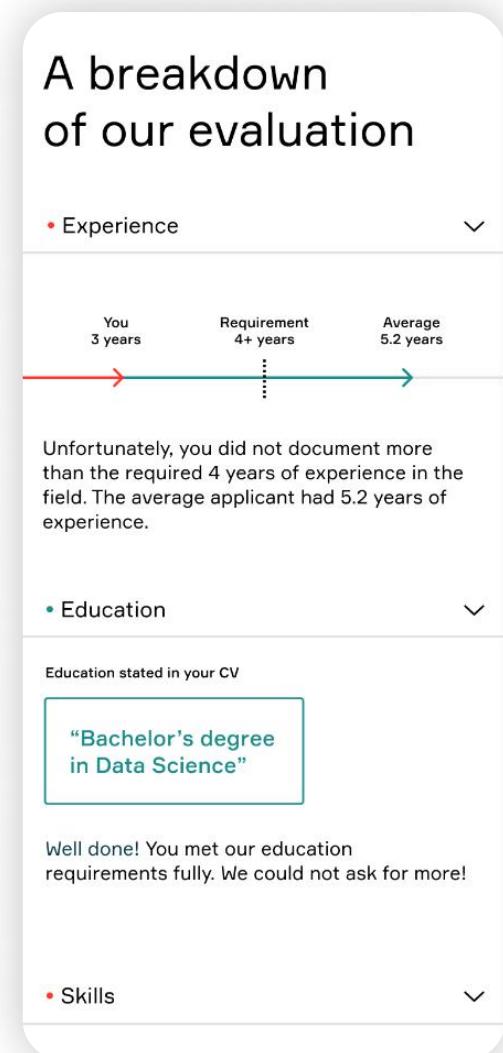


Execution

The applicant gets an overview of his performance compared to other candidates .



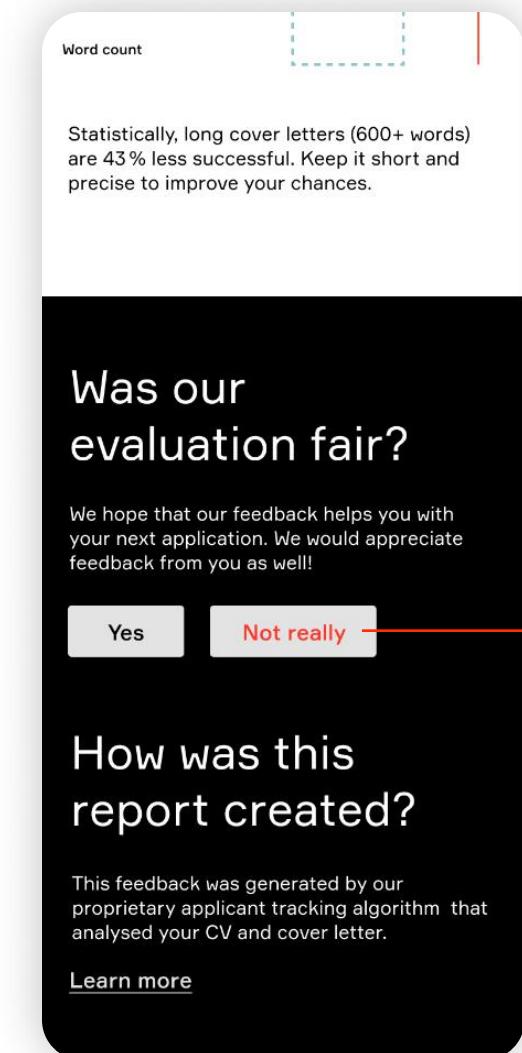
In the next section, the individual scores are argued for.



Tips for improvement are meant to help with the next application.



At the end, the user is encouraged to give his own feedback.



- visualizing scores enables transparency

- explains the hiring process
- shows evaluation criteria

- empowers applicants through actionable feedback

- creates accountability
- gives ability to question the system
- allows to contest an automated decision

Feedback

“Candidates would be happy – despite it being a big company, I got a somewhat personalized feedback.”

Recruiter

“I might want something a bit more sterile”

Designer

How we responded: Changes to the UI



Having playful elements on a rejection message could be seen as frivolous. Therefore, we decided to remove them to convey a more serious feel.

Reflections

Providing personalized feedback would not only benefit the job seeker but also big companies who normally do not get back to the rejected candidates. It could also improve the company's brand image .

On the other hand, the tool could also expose unfair evaluation criteria, resulting in negative criticism that might force the hiring companies to change their recruitment practice.

2. Screening Machines

Context

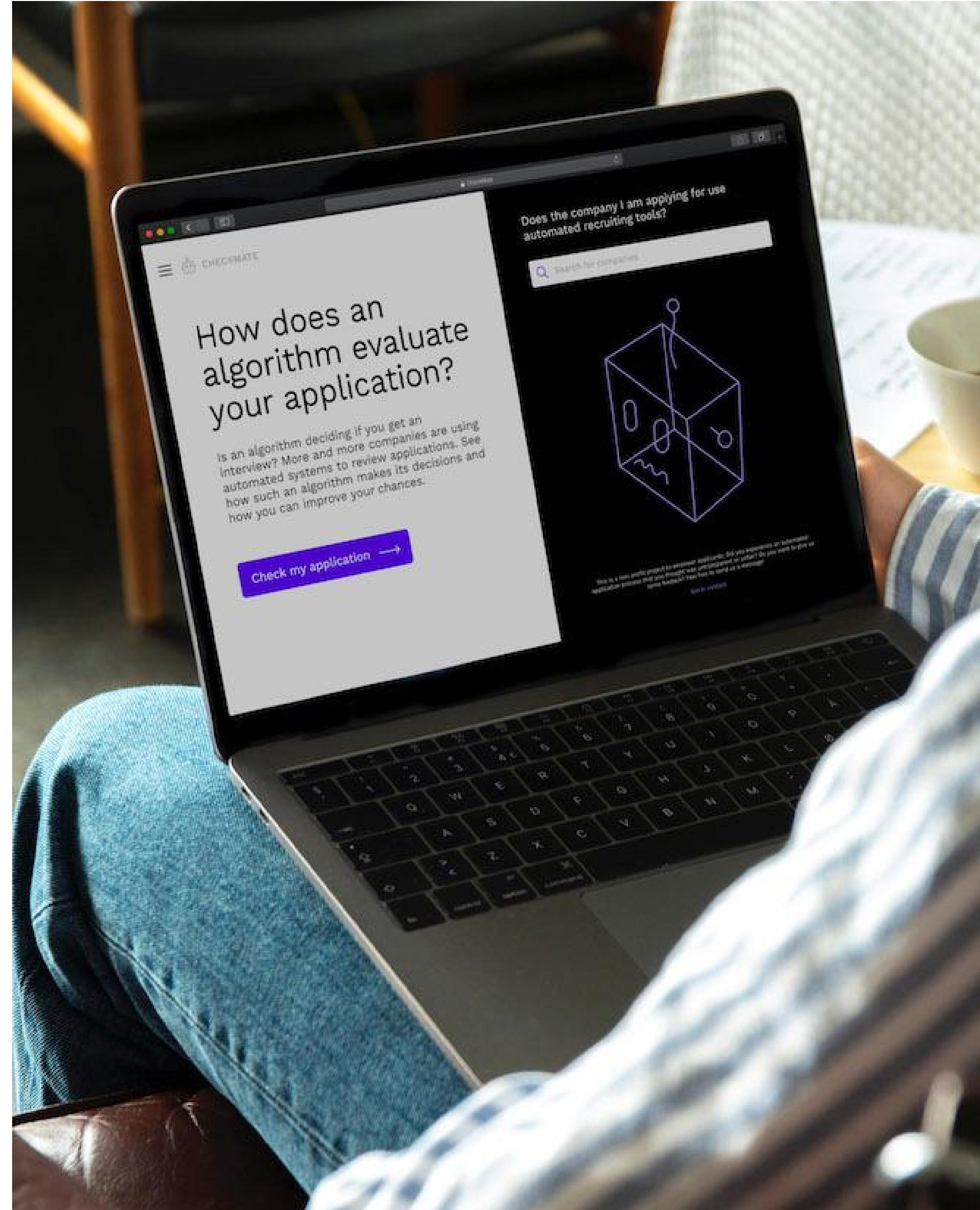
As evidenced in our research, several companies use automated recruiting tools to screen candidates. At the same time, we observed a rising trend of continual self-optimization and self branding to better one's chances at being hired.

Existing AI services that claim to improve resumés and increase an applicant's approval chances got us thinking: How does self-optimization apply to automated screening?

How can we enable job applicants to better understand the application screening process, as it happens?

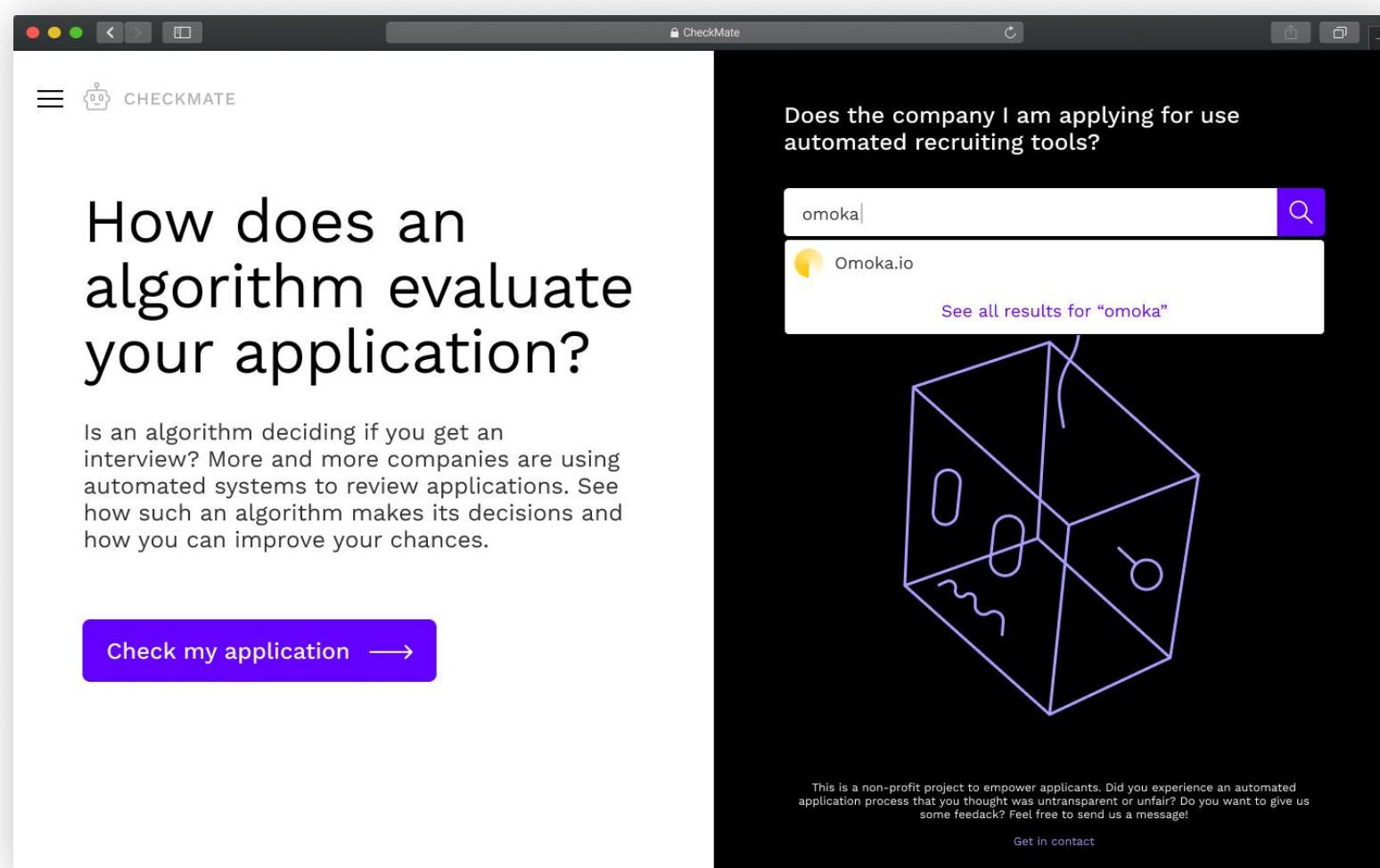
Concept

To enable an understanding of the automated systems that screen applications, we imagined the web tool 'CHECKMATE' intended as a service for the candidate, that visually shows them how an algorithm evaluates their application. In essence, the job seeker gets to see how the machine 'sees' their resume, what it considers and what it discards.

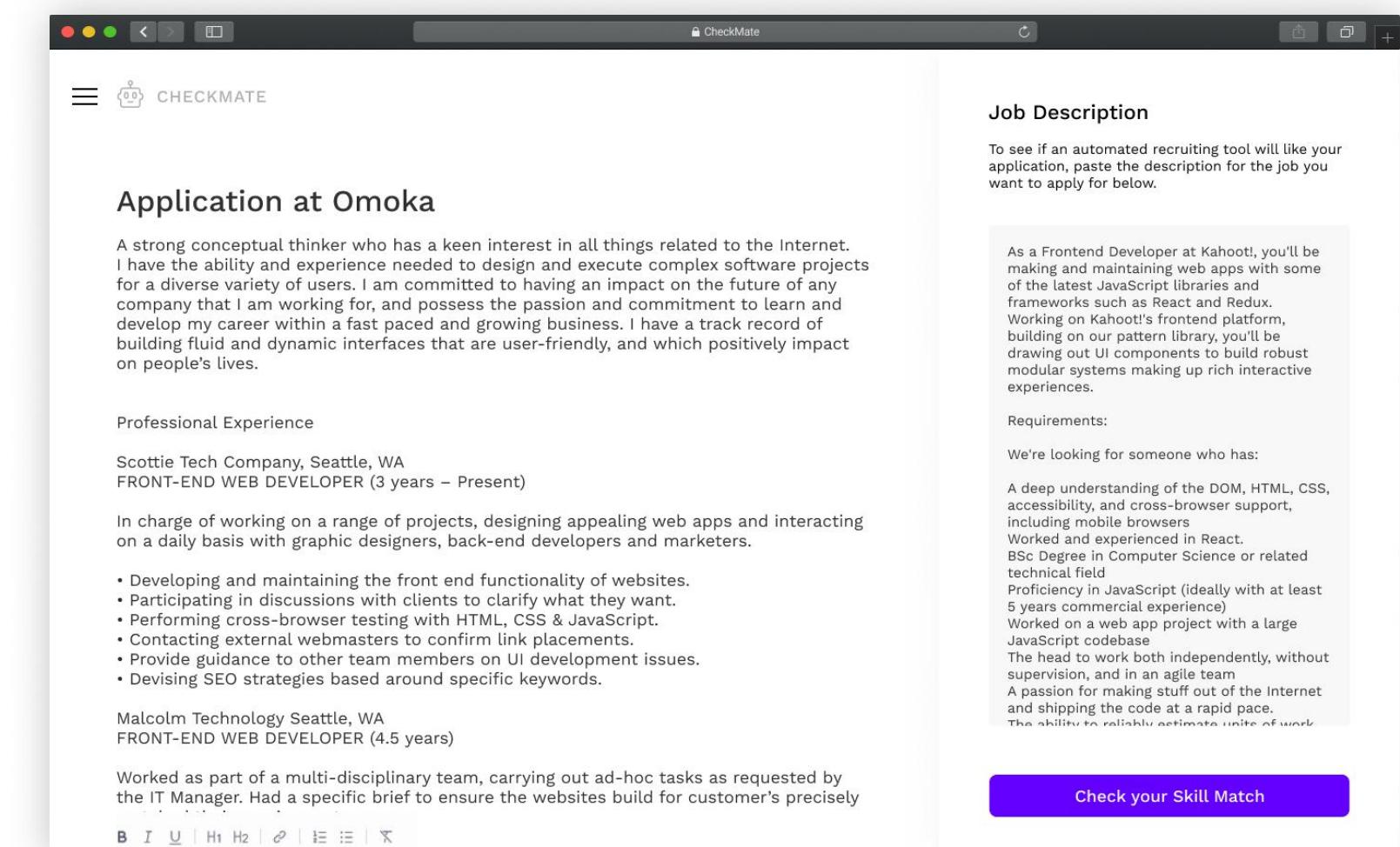


Execution

A search bar lets users check if the company they are applying to uses automated screening in their hiring process.



In the text editor, the applicant pastes or uploads their resumé. The job description is either copied in from a job-board or auto-filled via hyperlink.



- convenient background check on the company promotes accountability

Execution

The ‘Human|Machine toggle’ feature allows the user to switch between human and machine vision. Job seekers can now see how their applications would be processed.



The built-in text editor facilitates improvements to the job applications and saves the documents locally.

- enables understanding of the automation processes involved, such as ‘Keyword Extraction’ and ‘Keyword Matching’ etc.
- allows applicants to optimize their application for an automated assessment in an informed manner

Feedback

“I thought it was really cool to switch between the machine lens and the human lens”

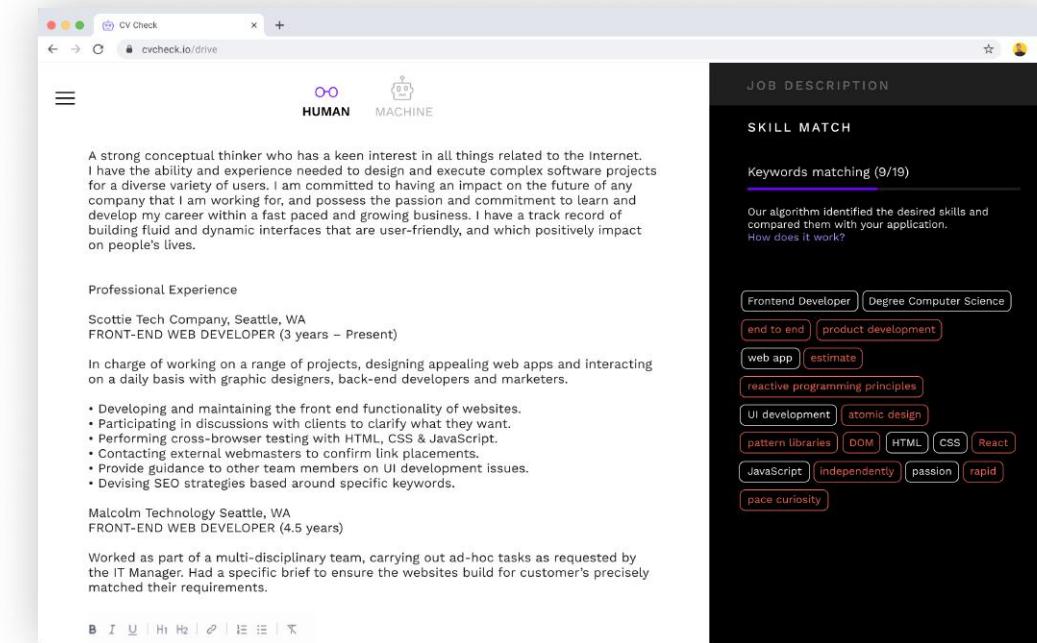
Designer

“Is keyword matching all it does?”

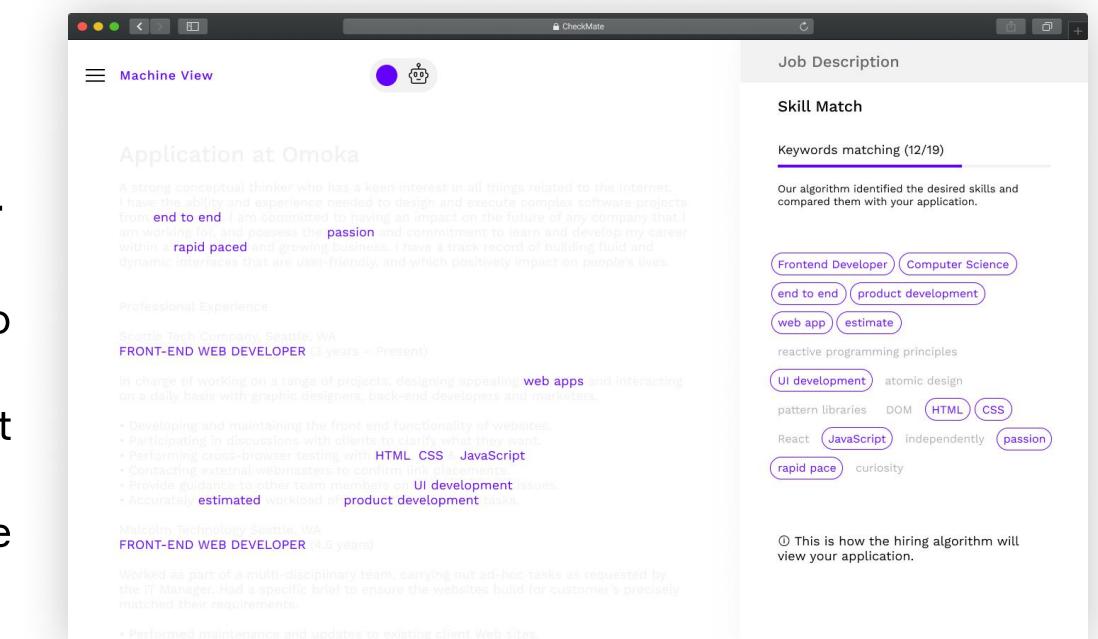
Recent Job Seeker

“This tool could be good but misused over time (over-reliance)”

Recruiter

How we responded

Previous version



An improvement of the color palette ensures readability and helps users navigate the app.

A next step would be to add an additional section for a ‘sentiment analysis’. For our purposes, it would have made the prototype to extensive.

Reflections

Being overly reliant on a service like this could have far-reaching effects. Applications could become increasingly generic and lose their human touch.

Would we only write in keywords? That might impress the screening algorithm but not the human recruiters.

3. The Perfect Fit

Context

Pilots use flight simulators to learn how to fly planes. Could a simulator show you how to be ‘successful’ at a job application?

Picking up from where the last story left off, this scenario is our attempt at investigating the consequences of the constant ‘algorithmic self-optimization’ race. Our digital intervention takes the form of a self-learning AI simulation.

Targeted towards tech-savvy job applicants, it generates and tests multiple applicant versions of themselves to find the ‘ideal profile’ **fit**.

Concept

‘HireHaxx’ – An unlicensed tool to get your application past the screening bots and into the hands of a human recruiter. Inspired by serial key generators from the early 2000's, commonly used for cracking licensed games and software, this tool aims to crack the ‘formula’ of the ideal applicant profile for any job.



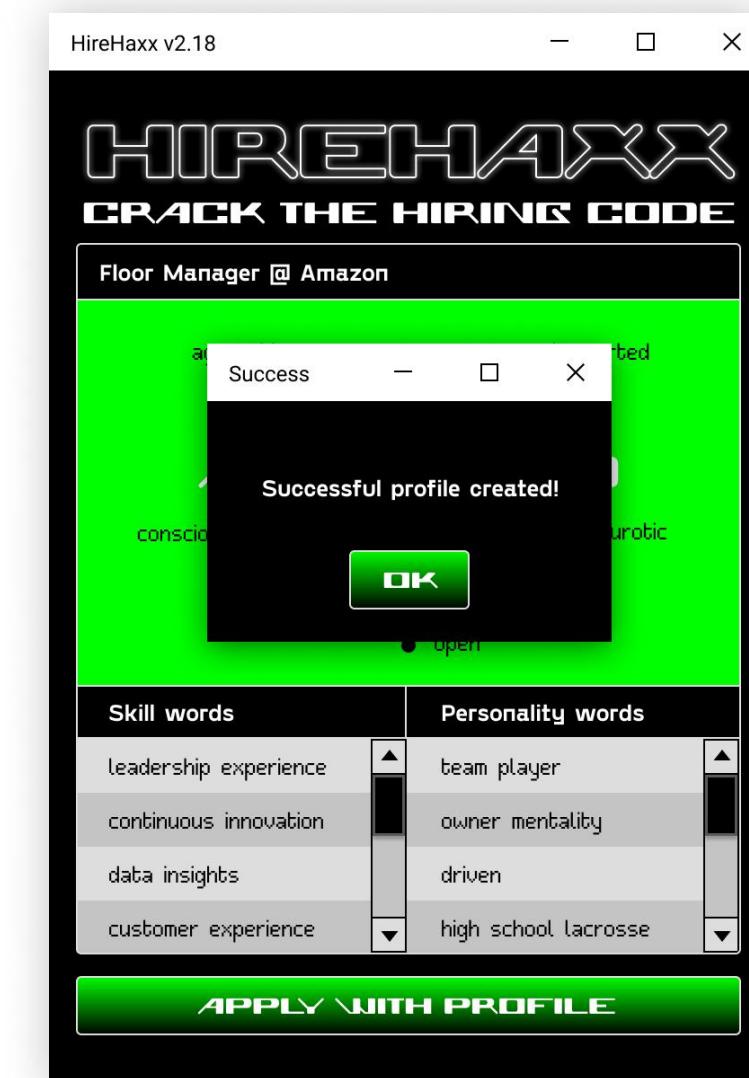
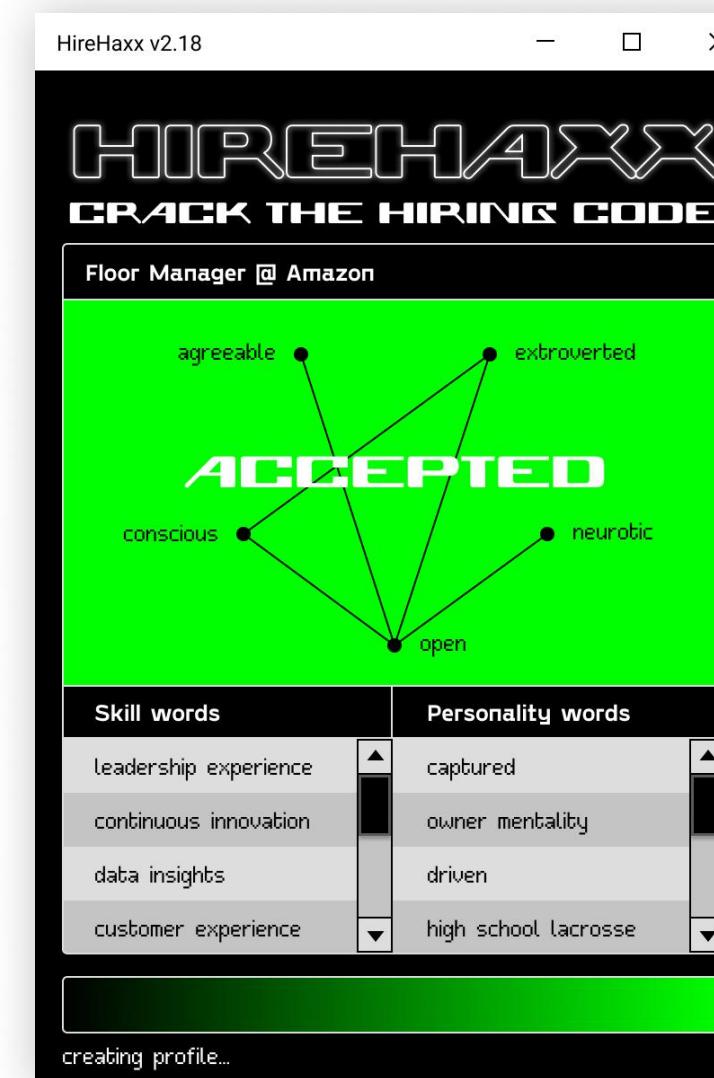
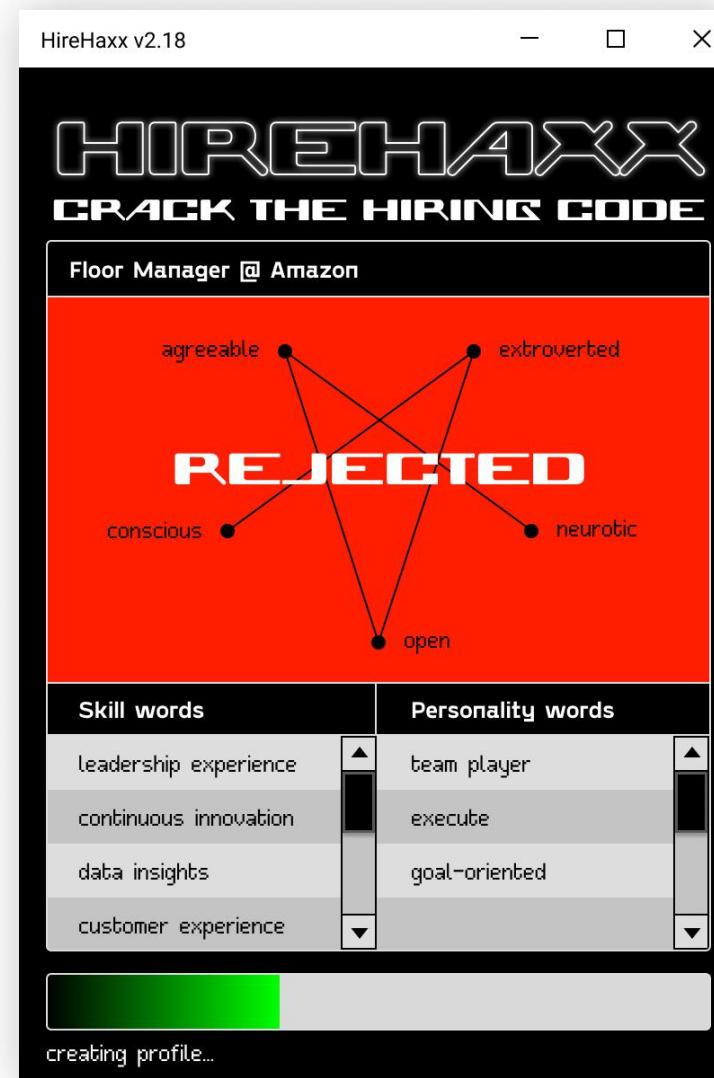
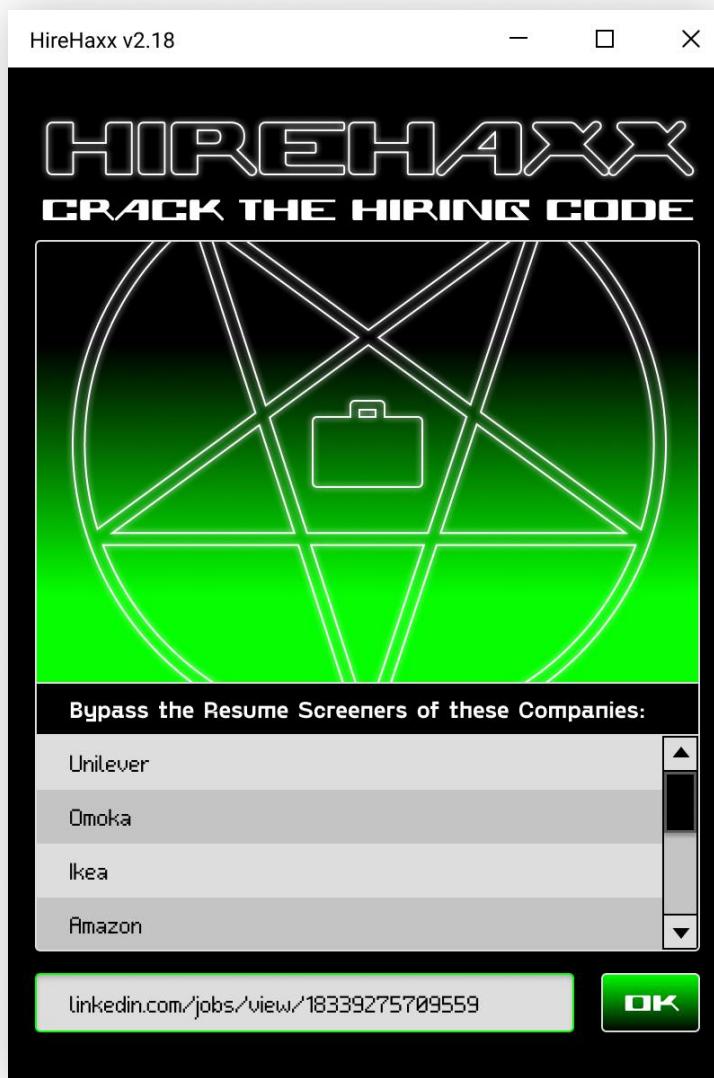
Execution

By pasting the link to the job post, job seekers can select their desired job.

When deciding to ‘create a persona’, the software starts sending out multiple applications to the company.

With each failed application, it iterates and learns. Using different keywords, it mimics different personas until it is successful.

It then presents the user with a profile that can get past the automated screening tool easily.



Hacking can be viewed as a way to break the system by exposing its flaws, giving way to new, improved processes.

– allows job seekers to ‘fight back’

- disrupts the hiring process
- increases corporate awareness of flaws in automated systems
- forces change to recruiting system

Feedback

“I thought the hacking your way into the recruitment process was an interesting approach.”

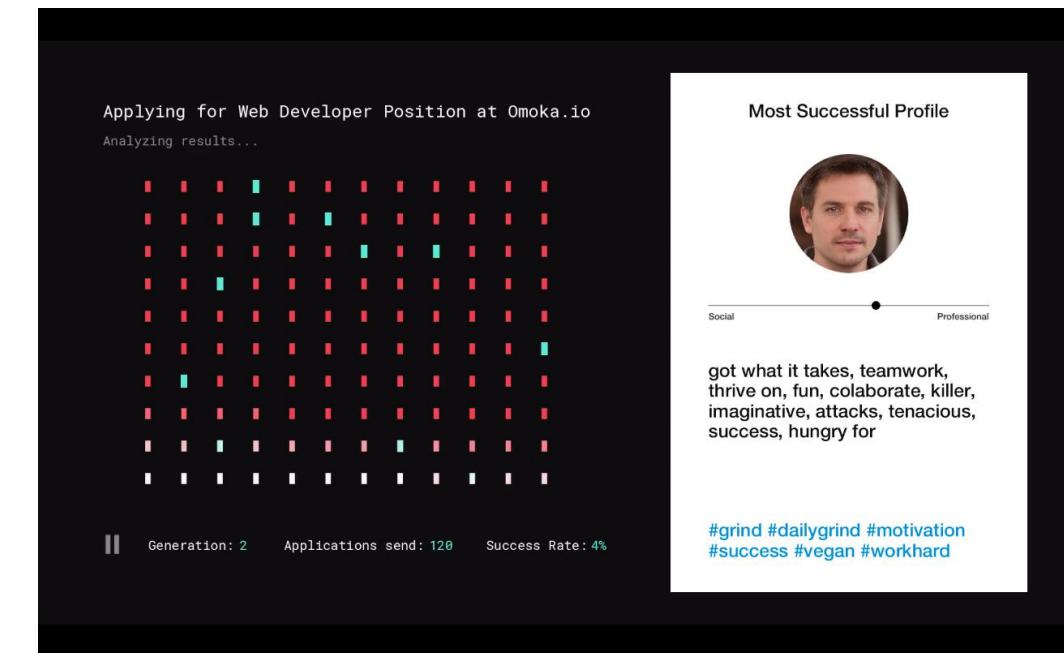
Designer, *Eggs*

“It looks like someone made it themselves and published it to the dark web. So maybe go extreme and make it really hacky.”

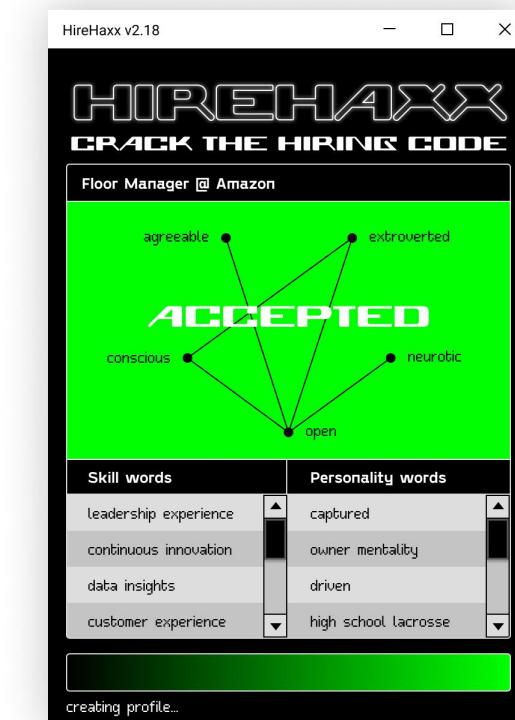
Designer, *Blank*

“Would a tool like this just enable an arms race between algorithms?”

Diploma Supervisor

How we responded

Previous version



In an overhaul of the first sketch, we gave the tool a brutalist DIY look to indicate it was a rogue software.

Reflections

This tool could potentially expose or reinforce biases in the hiring system. What if the perfect candidate always turns out to be a masculine, ivy league persona?

If several applicants tried to game the system using similar tools, the bar for success might skyrocket. The competitive advantage may get lost, rendering the purpose of the tool useless.

4. Incognito CV

Context

When an automated system is trained on unbalanced or unrepresentative data, it replicates human bias, placing job seekers of certain backgrounds at a disadvantage.

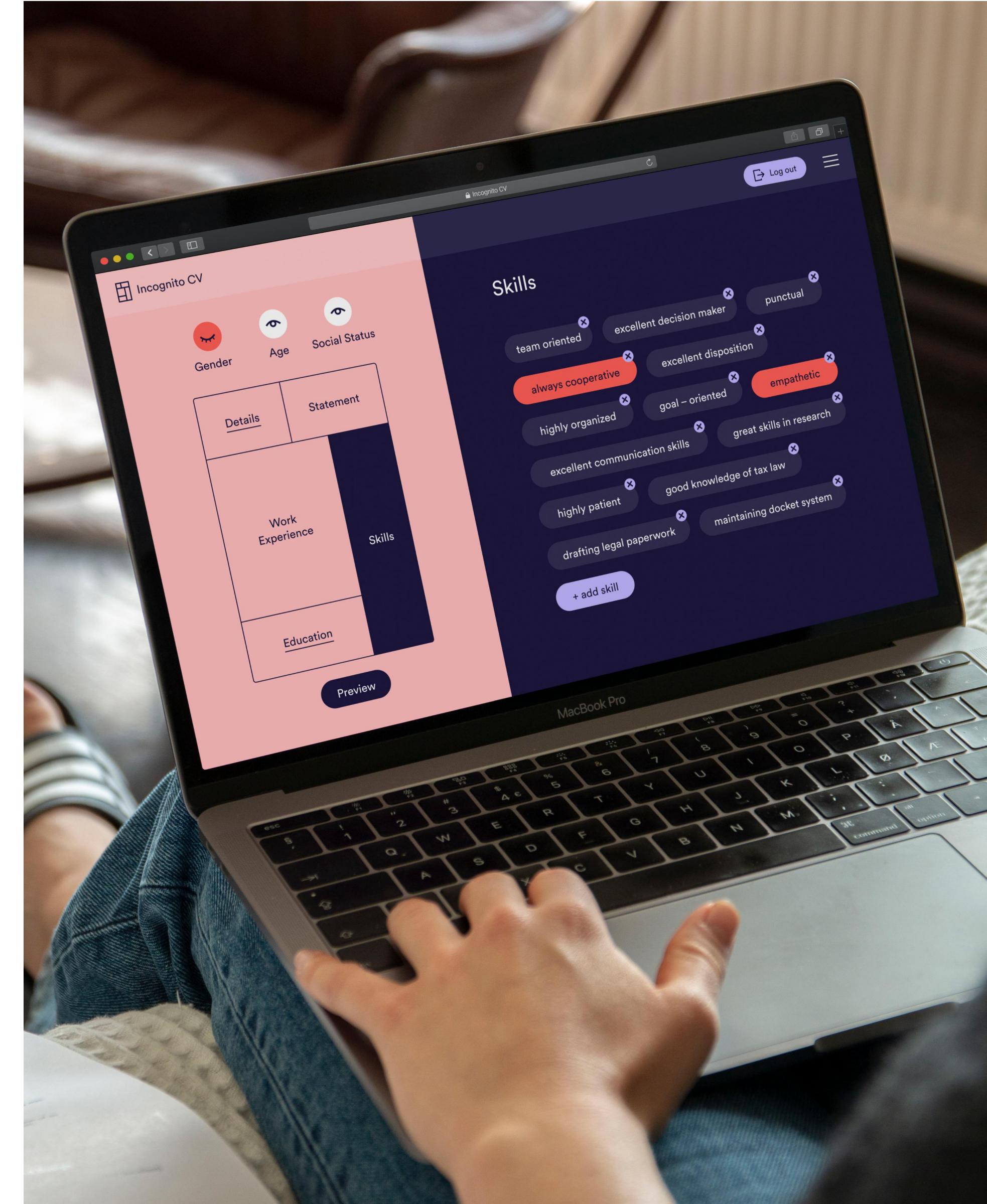
What can job seekers do to avoid algorithmic discrimination?

Concept

We prototyped a CV anonymization tool that allows applicants to select which personal details to conceal or reveal when undergoing automated screening, to avoid implicit machine bias.

Besides anonymizing obvious sensitive information, proxy words are also hidden preventing the recruiting algorithm from classifying you based on your personal background history.

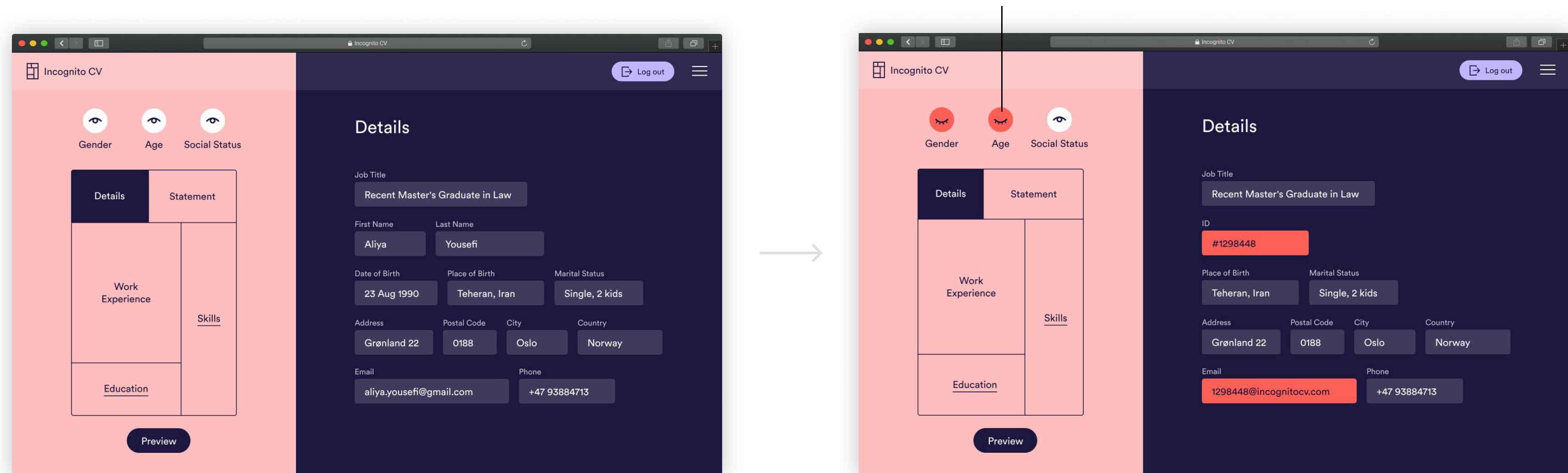
e.g proxy bias words for the male gender could be dominant terminology such as ‘executed’ or ‘captured’, often found in men’s resumes.



Execution

This tool lets users question what information ought to be shared in a CV.
Is an accurate evaluation possible when personal information is hidden?

Job seekers can choose if they want to show or hide their gender, age or social status by toggling the buttons.



Job seekers may become less prone to a biased hiring process, but fairness may come at the cost of efficiency or less accurate selections.

Feedback

“I think the considerations you show are interesting. I don't know if it completely removes biases...but it is good as a tool to ask yourself what you want to share.”

Anonymous expert

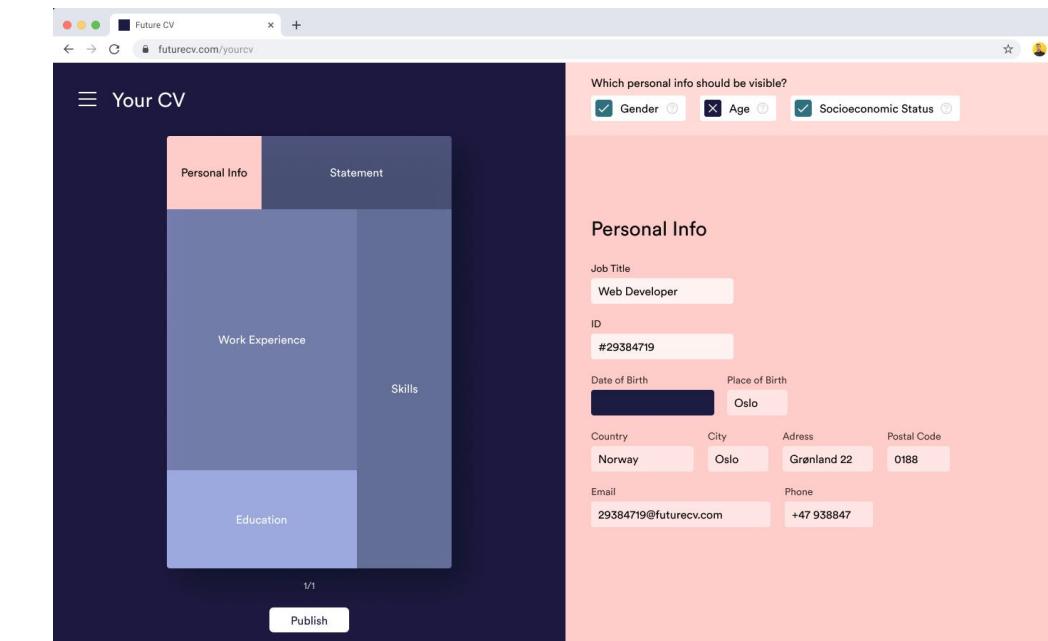
“Does removing this information help me or hurt me?”

Designer working with ethics

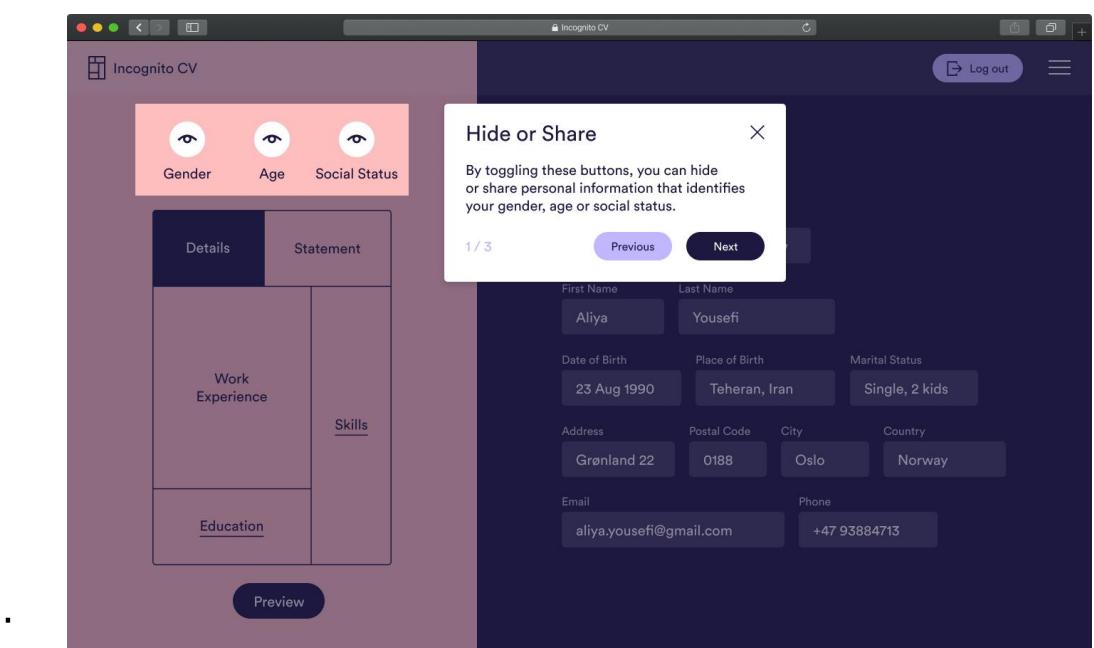
“What about the other things in your CV that are proxies for other social indicators?”

Job Seeker

How we responded



Previous version



To help users understand the impact of hiding and revealing information, we integrated tooltips.

Instead of just excluding obvious bias terminology, we also showed that proxy words would be hidden.

Reflections

Anonymization is nuanced and context specific.
The same tools that help someone could hurt
someone else's chances.

One way to counter bias may be not via enforced
anonymization, but rather through affirmative
action that supports vulnerable and minority groups
instead, purposefully boosting their chances.

Final Delivery

In order to reach a broader audience, and to add some visual flair that the original Dropbox paper lacked, we decided to host our work online.

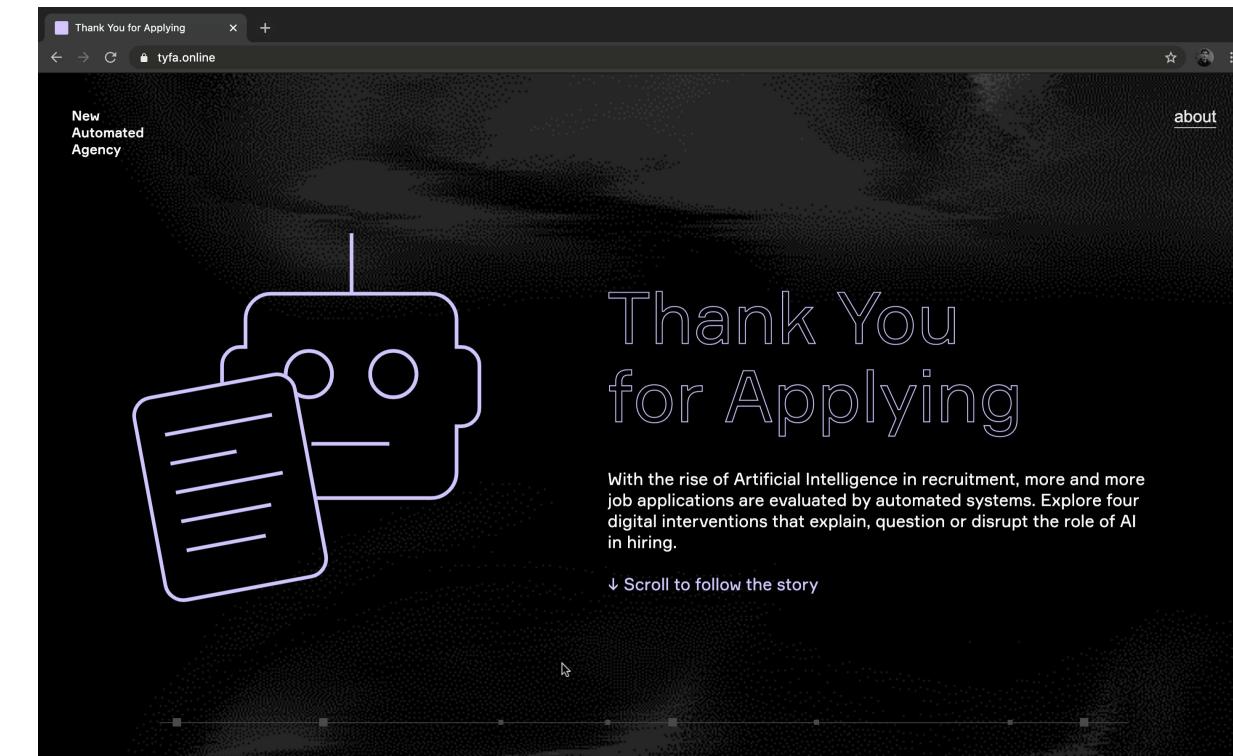
New Automated Agency

The activism aspect of our project was favourably received, and we therefore chose to create a mini-manifesto that adds context to the website:

‘The New Automated Agency (NAU) is a student-led design think-tank that pilots interactive digital experiments to investigate the consequences of AI powered recruitment. In the face of rising usage and reliance on automation, NAU aims to raise awareness and enable people to reclaim some of the agency that automation takes away from us.’

This ‘about’ section clearly informs all visitors that the digital interventions are non-commercial in nature.

Website structure



The resulting website has a simple structure: By scrolling, users can navigate a timeline and discover different scenarios built around the central theme of automation in recruitment. Short stories are delivered as small, easily consumable text and supported by digital props such as fictitious news headlines, social media screenshots etc.

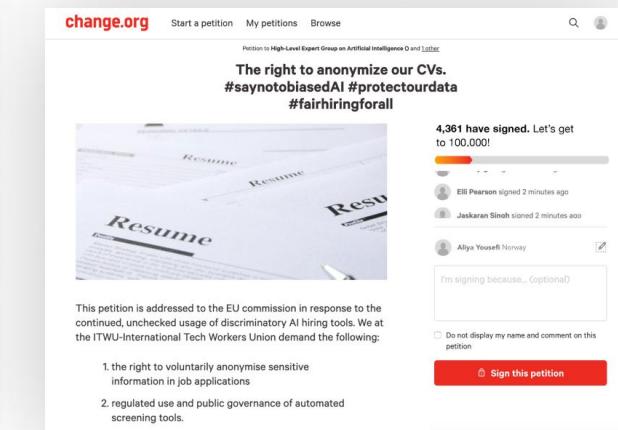
Kindly note, since we are designers and not coders the website might not be completely bug-free. For the best experience, please view the website on a laptop or computer using the Chrome browser.

The Timeline



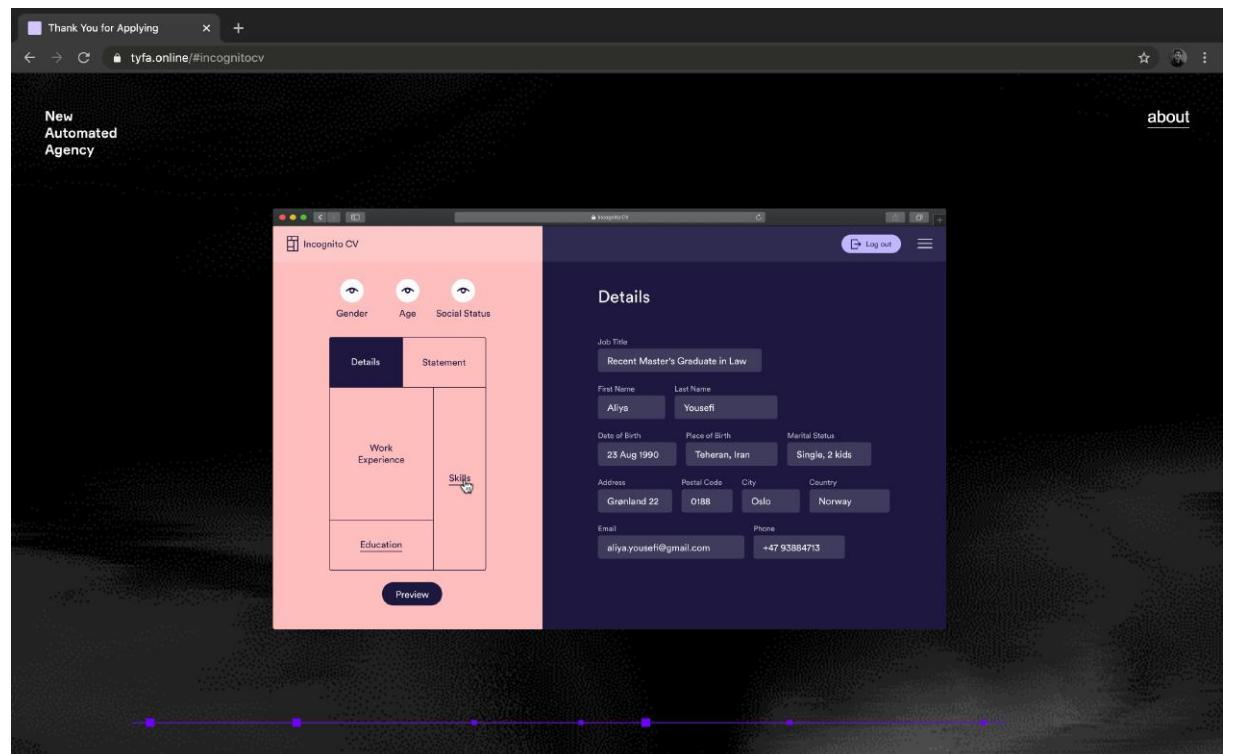
The time based narrative takes us through recent events, the present and stories of a possible tomorrow, divided into 4 scenarios each leading to a specific digital intervention and multiple choice conclusion.

Digital Props

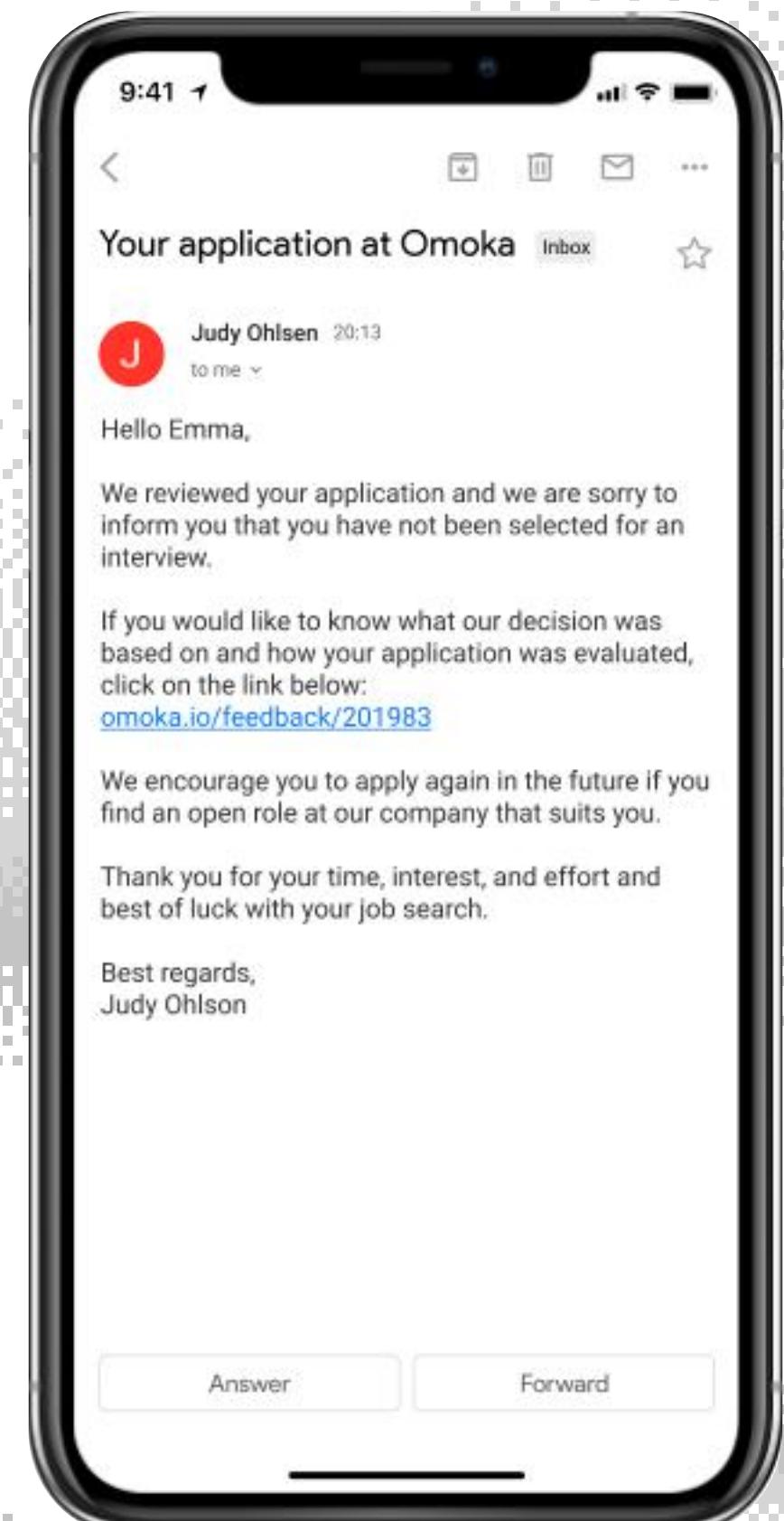


Fictitious news headlines and social media screenshots helped us to set the scene. They also added much-needed credibility and continuity to the narrative, for a more immersive experience.

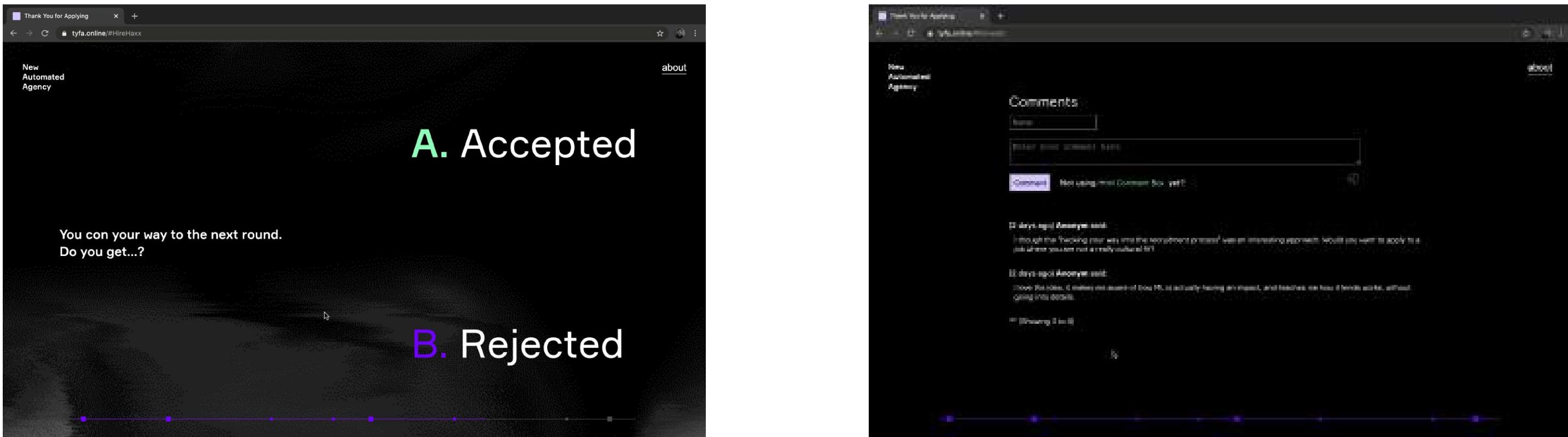
The Prototypes



The clickable prototypes are woven into the stories as part of the overall experience.



Tools for discourse



Each scenario ends with an open question, asking the user to choose between two options. This low threshold way of questioning allows people to reflect on the possible consequences of our interventions.

Last, a public comment section at the end allows visitors to the site to voice their own opinions, view others' remarks and join the larger discussion around automated recruitment.

Interventions.

The screenshot shows a dark-themed website for 'New Automated Agency'. At the top left is a purple square icon with a white 'T' and the text 'Thank You for Applying'. The top right features a navigation bar with a user profile and a 'about' link. A large, stylized white line-art illustration of a head and shoulders is positioned on the left side. The main title 'Thank You for Applying' is centered in a large, white, sans-serif font. Below it is a smaller paragraph: 'With the rise of Artificial Intelligence in recruitment, more and more job applications are evaluated by automated systems. Explore four digital interventions that explain, question or disrupt the role of AI in hiring.' A call-to-action button '↓ Scroll to follow the story' is at the bottom. A horizontal scroll bar with small square markers is visible at the bottom.

With the rise of AI in recruitment, more and more job applications are evaluated by automated hiring systems.

In four scenarios situated on a timeline, we showcase how our digital interventions might explain, question, or disrupt the future of automated hiring.

Lately

250 CVs
are sent to the average
corporate job posting
according to [Glassdoor](#).

“Software that uses artificial intelligence can screen, grade, and rank every single resume you receive for an open req - instantly”

Ideal, software provider [49]

An audit of such a resume screening tool concluded that the algorithm found **two factors** to be most indicative of job performance...^[50]

‘their name was Jared,
and whether they played
high school lacrosse’

Quartz, 2018 [50]



≡

Amazon reportedly scraps internal AI recruiting tool that was biased against women

The secret program penalized applications that contained the word “women’s”

By James Vincent on October 10, 2018 7:09 am



“Unilever has claimed it is saving hundreds of thousands of pounds a year by replacing human recruiters with an artificial intelligence system, amid warnings of a populist backlash against the spread of machine learning.”

The Guardian, 2019 [51]

The Present

The pandemic leads to mass layoffs.

As the economy starts to slowly recover, applicants start reapplying for jobs en-masse. HR departments are overwhelmed.

Demand for fast, efficient processing of applications leads to sped up adoption of AI technologies in recruitment and automated screening.

The EU begins actioning legislative reforms for AI usage and human rights.

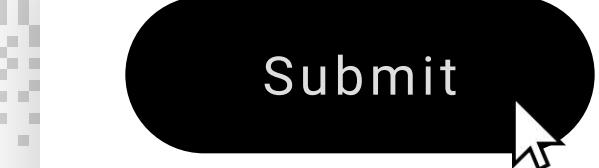
There are news features that call for more transparency and accountability.



Made with: <https://breakyourownnews.com/>

**“We regret to
inform you....”**

1/4



Be one of the first to sign up for a personalized feedback report.

No Yes

Emma, 26

...is a newly graduated web developer affected by the pandemic layoffs.

Lately, her mailbox has been packed with automated rejection responses. She gets them almost as frequently as she applies for new jobs.

They all sound the same, vague and impersonal.

"We regret to inform you that your application was not successful at this time, but please stay in touch for future opportunities"

What was lacking? she wonders. Could she have done things differently or changed her approach?

As she submits an application for yet another job, she sees a beta feature for a "Feedback Report".

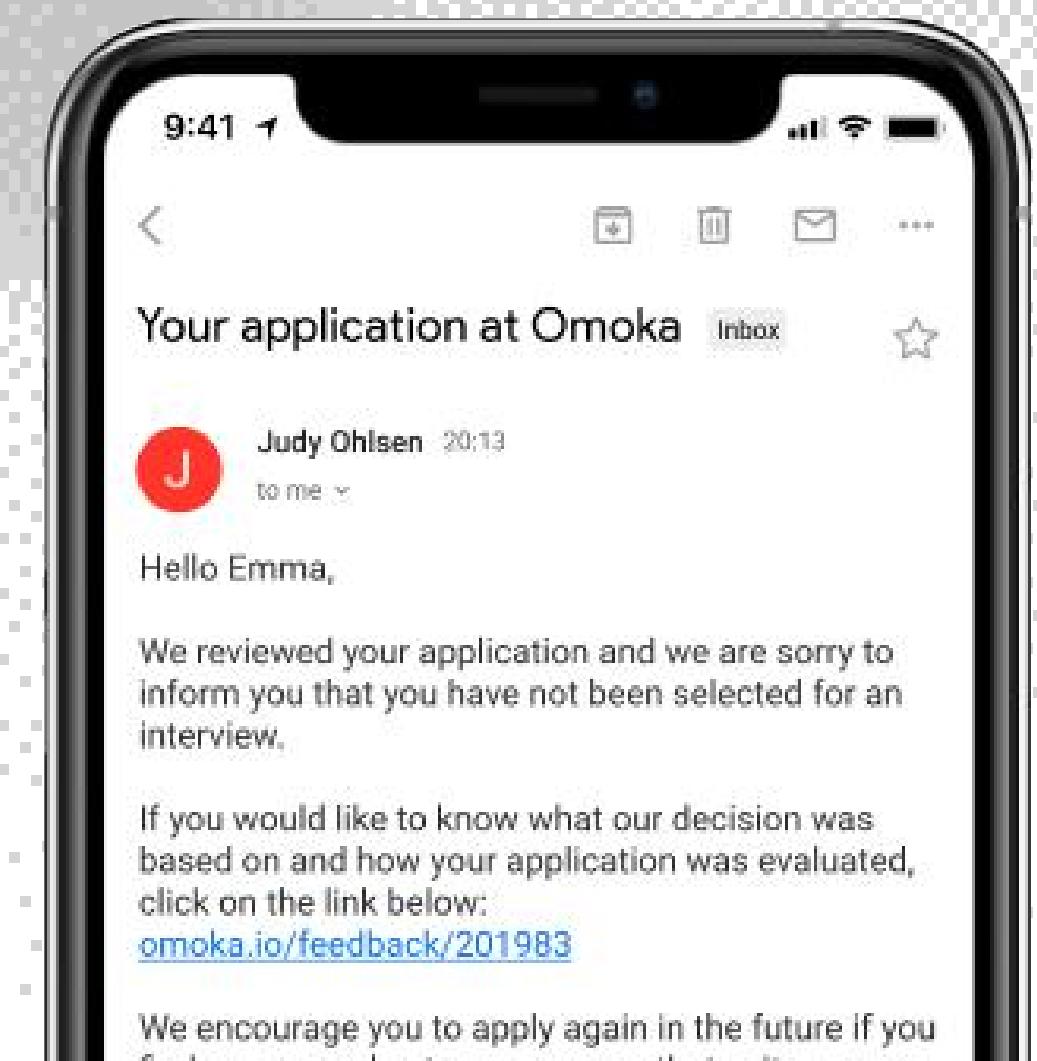
"Sure, why not"

Couple of weeks later, her inbox 'pings' to let her know she didn't get in. Oh well.

But wait, this email looks a little different .

There's a link at the bottom promising her the 'feedback' she had signed up for. Curious to learn more, she clicks and is redirected to a personalised mobile-friendly report.

She begins reading.





Possible consequences

How does Emma feel after reading the report?

Informed.

She is able to improve her next application and get her CV through to the recruiter.

Big corporations start implementing the tool to promote responsible hiring practices and strengthen their brand image.

Unfairly treated.

She complains on twitter about the result. Several other applicants chime in with similar stories.

Rattled by the negative press, the company is forced to redesign their evaluation criteria to be more fair.

Screening Machines

2/4

Artem, 47

is a skilled ex-technician currently looking a change in career. Much of his day is wasted making several iterations of the same CV. Creating variations of the same cover letter and filling in the same information over and over on various job boards. It's frustrating and thankless work.

On the recommendation of a former colleague, he had signed up for a new service called the 'Feedback Report.'

While the report itself was bit of a depressing read, it made him feel like he had more insight into the hiring process.

This feedback was generated by our proprietary applicant tracking algorithm that analysed your CV and cover letter.

[Learn more](#)

While re-reading it, the section with matching skills and keywords catches his attention. He clicks on '[Learn more](#)'. It takes him to an affiliate product site for 'CHECKMATE'.

Dear Peter,

I am wr
the Acc
Crane &
descrip
since I
highly a
Jenkins

Hi Alice,

This is to ex
Accounting
was excited
the job des

Hi Aisha,

This is to express
Accounting posit

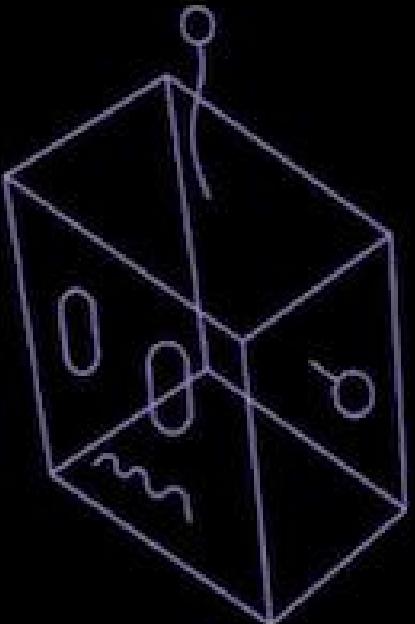
Dear Lauren,

How does an algorithm evaluate your application?

Is an algorithm deciding if you get an interview? More and more companies are using automated systems to review applications. See how such an algorithm makes its decisions and how you can improve your chances.

Check my application →

Does the company I am applying for use automated recruiting tools?



Is it important to know if an algorithm is used to review your applications? Do you want to understand how such an algorithm makes its decisions? Do you want to know what you can do to improve your chances? Get in contact!



Possible consequences

Does he trust the tool?

Yes.

He gets overly reliant on the tool which makes his applications look increasingly generic.

He often gets past the automated screening systems but can no longer impress the human recruiters.

No.

However, several other applicants start using it to optimize their resumes. Eventually he is forced to do the same to keep up.

A Possible Tomorrow

People slowly start understanding how the algorithms work. In the face of growing competition and use of automation in HR, there is an accelerated trend of optimizing CVs for better machine legibility.

The Perfect Fit

3/4

[Start a New Thread]

05/04/17 New trial board added: /bant/ - International/Random

10/04/16 New board for 4chan Pass users: /vip/ - Very Important Posts

06/20/16 New 4chan Banner Contest with a chance to win a 4chan Pass! See the contest page for details.

[\[Hide\]](#) [\[Show\]](#)

Alex, 27

has been unemployed for a while. He feels a little disillusioned with this whole automated hiring charade.

His days are spent working a minimum wage job while searching for something better. Most weekends are spent gaming.

He's been applying to the same job listing at Amazon multiple times. While browsing CV optimization tools online, Alex finds out about an unlicensed software called '**HireHaxx**' on an online gaming forum.

Search OPs... [Catalog] [Archive]

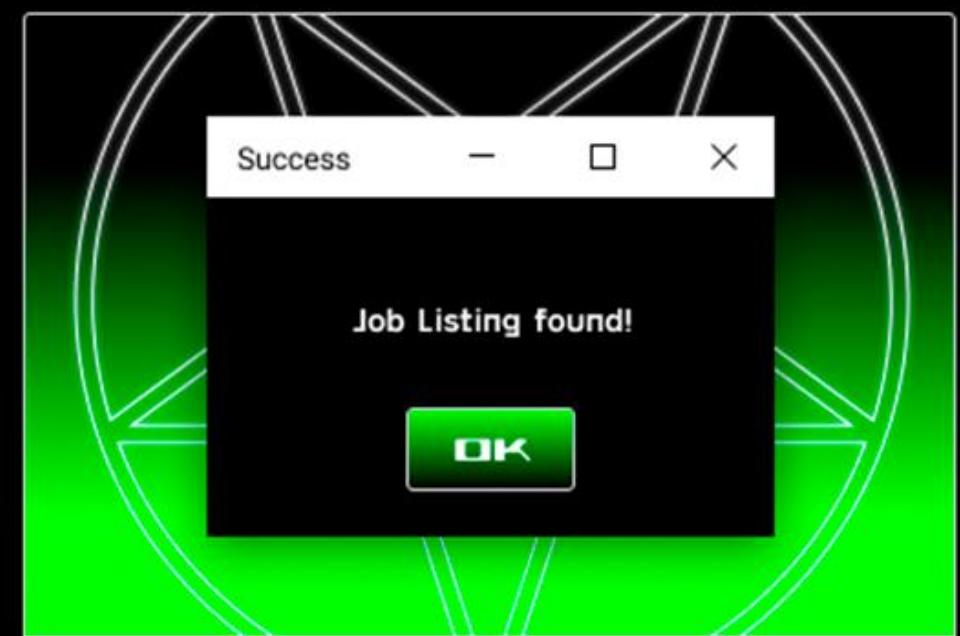
Re: [chart.jpg](#) (110 KB, 833x837)



**cheaters
hackers
pirates**

customers

HIREHAXX
CRACK THE HIRING CODE



don't wait...Get that application past the CV screeners now!

Anonymous (Thu)11:50:46 No.5109067
[>>510907193](#) [>>510907372](#)

The real reason PC gaming is dying.

2 replies omitted. Click here to view.

>> **Anonymous** (Thu)11:53:41 No.510906860

[>>510906860](#)

Same way it's been dying since it's inception



Possible consequences

**Alex cons his way to the next round.
Is he accepted or rejected by the recruiter?**

Accepted.

He beat the system and made it to the next round of interviews. He even got the job, but felt like he didn't fit in. He quits shortly after.

Rejected.

The hiring company finds out about the security breach and disqualifies all successful applicants, including him. His profile gets blacklisted from future job openings at Amazon.

Incognito CV

4/4



In response to discriminatory AI hiring tools and their continued unchecked usage, a workers' union launches a petition calling for mandatory anonymization of sensitive information in CVs, as a means of countering automated screening bias.

But what does anonymization mean for fair hiring? The petition gets over 4000 signatures in 5 days and sparks a twitterstorm, eliciting strong sentiments from employers and employees alike.

The union calls for volunteers to test their 'INCOGNITO CV' service to determine what may or may not be hidden to help vulnerable job-seekers.

Aliya, 34

is a law school graduate with 2 kids, who moved to Norway from Iran when she was 15.

After learning the language and completing her studies, she began working for NAV, a state welfare agency, ...

She also applied to 50 other jobs relevant to her master's degree in law studies. **Aliya was only called in for three interviews.**

Even though she realizes that other applicants may have had even higher qualifications than she does, Aliya can't help but wonder whether her name and background played a role in all the refusals she had.

She wants to find out if anonymizing her age and marital status could help her chances.

After signing the petition, she decides to volunteer as a test user for 'Incognito CV'.

change.org

Start a petition My petitions Browse

Petition to High-Level Expert Group on Artificial Intelligence 0 and 1 other

The right to anonymize our CVs.
#saynotobiasedAI #protectourdata #fairhiringforall



4,361 have signed. Let's get to 100,000!

Elli Pearson signed 2 minutes ago

Jaskaran Singh signed 2 minutes ago

Aliya Yousefi Norway

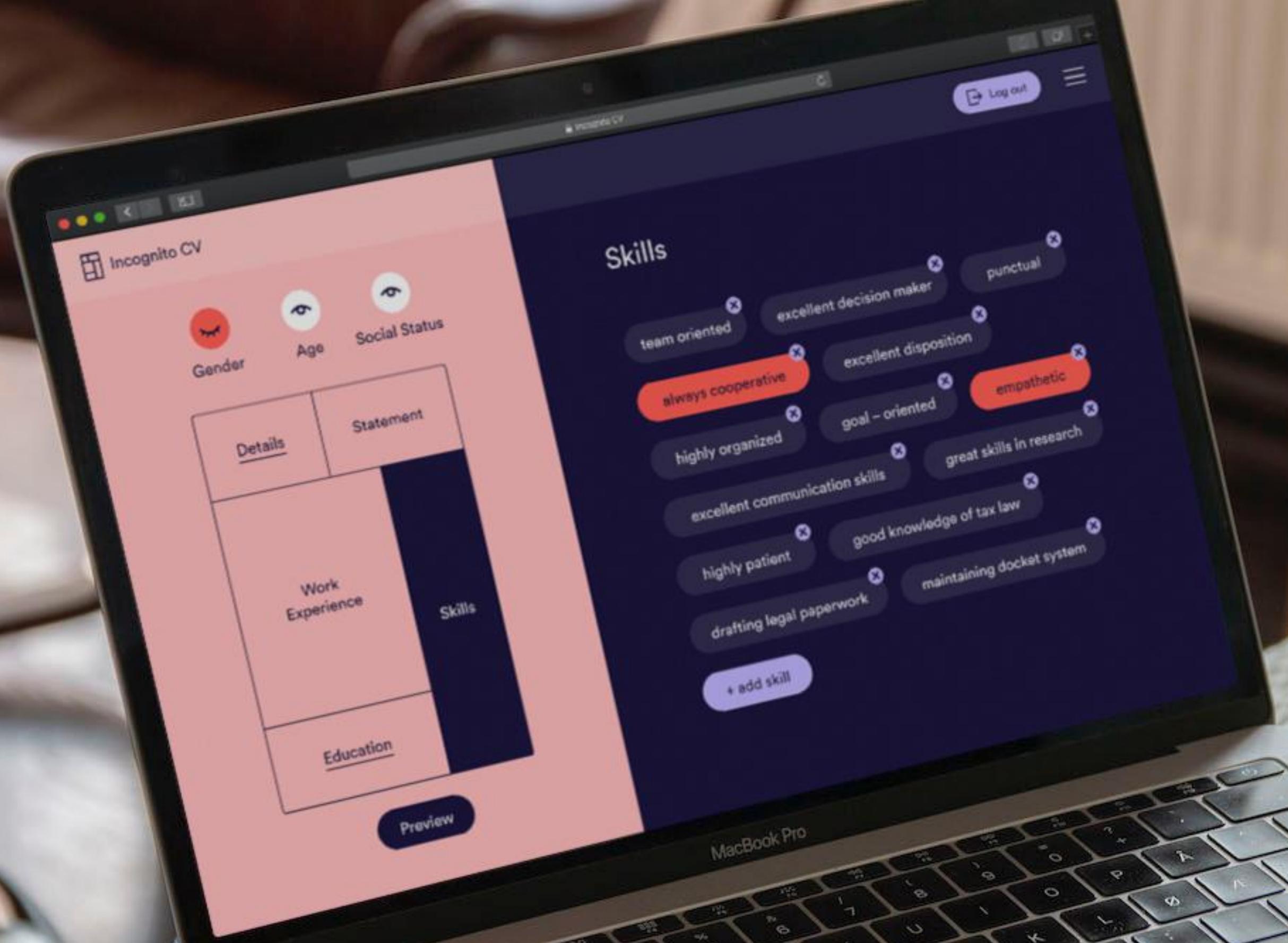
I'm signing because... (optional)

Do not display my name and comment on this petition

Sign this petition

This petition is addressed to the EU commission in response to the continued, unchecked usage of discriminatory AI hiring tools. We at the ITWU-International Tech Workers Union demand the following:

1. the right to voluntarily anonymise sensitive information in job applications
2. regulated use and public governance of automated screening tools.



MacBook Pro

Possible consequences

Did going ‘Incognito’ help her chances?

Yes.

She avoids being subject to an age bias, and gets hired as the sole law consultant in her age group. Following a successful career stint, her firm puts her in charge of hiring more diverse talent.

No.

She hides too much relevant information and gets rejected. Companies trying to access more diverse profiles like her miss out on potential talent.

The Way Forward.

The journey through these stories is intended to serve as little windows of insight into the multi-faceted complexity of automated recruitment technologies.

We hope that engaging with this project results in a plurality of public reactions leading to concrete acts, be they caution, protest or hope.



Conclusion.



Meta Reflections

1. Search for optimization leads to awareness

Most job seekers initially search for online resources to optimize themselves and their CVs, without the explicit intent of gaining more technical know-how. Understanding may come as an unexpected consequence, later or along the way.

If these services were to exist in the real world, they might help nudge job seekers towards that path of awareness and understanding.

2. Increased pressure for corporate AI responsibility

While our program was primarily tailored to help job-seekers, as we discovered from our feedback sessions, it could also compel employers and software firms to take more responsibility and track the usage of artificial intelligence technology more closely.

3. The entire hiring system in clear need of an overhaul

While automated hiring does not give everyone a fair chance neither does the traditional hiring process. We found a mutual lack of confidence and trust in the capabilities of current automated recruitment systems, both by employers and candidates alike. Neither party is happy with the way things are.

Hopefully our project and other similar initiatives can be the starting point for this transition.

4. Inter sectoral transferability of consequences and actionable measures

The issues resulting from unregulated use of these automated decision-making systems extend beyond the recruitment industry alone. The same spirit of awareness and disruption that we are seeking to promote through this project can be extended to other critical areas such as law , medicine, education, and housing, where the use of AI is widespread as well.

The Way Forward

Technology is an accelerant of existing societal issues; design efforts like ours, which train a critical lens on it, are never complete but a work in continuous progress.

As artificial intelligence technologies continue to sneak into our lives, we must learn to question, respond, and adapt to the threats and opportunities it presents, in solidarity — not ‘jobseekers’ or ‘users’ but a community of people.

Ending Thoughts

As mentioned in the beginning, we were well aware of the current hype and speculation surrounding the relative newness of AI technology, as well as its complexity and breadth of scope.

The ready availability of an immense amount of AI literature made conveying essential background information effectively for the report a challenge. This forced us to be very diligent about our design choices and our resulting line of argumentation

Throughout the whole process we have tried to be as objective and opinion-neutral as possible, but we also understood that total objectivity is humanly impossible.

However, on a positive note, being students without any commercial obligations allowed us to use this opportunity to raise awareness of our topic in an open manner.

We have tried to use our existing skill-sets and tools as UI designers to tackle this project, bringing each of our own strengths into the mix.

Constantly bouncing ideas off each other and justifying our design decisions made this a collaborative process from start to end, as well as it contributing to a more solid project overall.

References.

- # Citations
- [1]<https://www.theguardian.com/inequality/2018/mar/04/dehumanising-impenetrable-frustrating-the-grim-reality-of-job-hunting-in-the-age-of-ai>
- [2]<https://hbr.org/2020/03/research-to-reduce-gender-bias-anonymize-job-applications>
- [3]<https://facebook.com/inhumansoflatecapitalism/post>
- [4]<https://www.technologyreview.com/2019/11/07/75194/hirevue-ai-automated-hiring-discrimination-ftc-epic-bias/>
- [5] <https://www.indeed.com/community/interview-tips/online-assessment-tests-good-grief/td-p/2209067>
- [6]https://www.accenture.com/_acnmedia/Thought-Leadership-Assets/PDF-2/Accenture-Fjord-Trends-2020-Report.pdf
- [7] "Autonomy." Autonomy, <https://autonomy.work/>.
- [8] Donges, Niklas. "The Non-Technical Guide to Artificial Intelligence." Medium, Towards Data Science, 27 Aug. 2019, <https://towardsdatascience.com/the-non-technical-guide-to-artificial-intelligence-e9e5da1a15c5>.
- [9] McIntyre, Catherine. "Facebook Allowed Housing and Employment Advertisers to Exclude Users with Indigenous Interests." The Logic, 20 Jan. 2020, <https://thelogic.co/news/big-tech/facebook-allowed-housing-and-employment-advertisers-to-exclude-users-with-indigenous-interests/>.
- [10] <https://facebook.com post, Name and identity withheld>.
- [5] <https://www.indeed.com/community/interview-tips/online-assessment-tests-good-grief/td-p/2209067>
- [6]https://www.accenture.com/_acnmedia/Thought-Leadership-Assets/PDF-2/Accenture-Fjord-Trends-2020-Report.pdf
- [7] "Autonomy." Autonomy, <https://autonomy.work/>.
- [8] Donges, Niklas. "The Non-Technical Guide to Artificial Intelligence." Medium, Towards Data Science, 27 Aug. 2019, <https://towardsdatascience.com/the-non-technical-guide-to-artificial-intelligence-e9e5da1a15c5>.
- [9] McIntyre, Catherine. "Facebook Allowed Housing and Employment Advertisers to Exclude Users with Indigenous Interests." The Logic, 20 Jan. 2020, <https://thelogic.co/news/big-tech/facebook-allowed-housing-and-employment-advertisers-to-exclude-users-with-indigenous-interests/>.
- [10] <https://facebook.com post, Name and identity withheld>.
- [11] Ajunwa, Ifeoma. "Beware of Automated Hiring." The New York Times, The New York Times, 8 Oct. 2019, www.nytimes.com/2019/10/08/opinion/ai-hiring-discrimination.html.
- [12] Ajunwa, Ifeoma. "Beware of Automated Hiring." The New York Times, The New York Times, 8 Oct. 2019, www.nytimes.com/2019/10/08/opinion/ai-hiring-discrimination.html.
- [13] Ideal | AI For Recruiting Software | Maximize Quality of Hire. ideal.com/.
- [14] "r/Humanresources - Comment by u/Power-Cube on 'The Future of HR.'" Reddit, www.reddit.com/r/humanresources/comments/bs39zh/the_future_of_hr/eoirur3/?utm_source=amp.
- [15] "r/Humanresources - Comment by u/Power-Cube on 'The Future of HR.'" Reddit, www.reddit.com/r/humanresources/comments/bs39zh/the_future_of_hr/eoirur3/?utm_source=amp.
- [16], [17] "AI and Your Resume: How to Beat the Bots." The Enterprisers Project, enterprisersproject.com/article/2019/7/artificial-intelligence-how-to-get-resume-past-ai-screen.
- [18] Murray, Seb. "Will a Robot Recruiter Be Hiring You for Your next Job?" The Guardian, Guardian News and Media, 2 Feb. 2018, www.theguardian.com/careers/2018/feb/02/will-a-robot-recruiter-be-hiring-you-for-your-next-job.
- [19] "Introducing AI Explainability 360." IBM Research Blog, 19 Sept. 2019, www.ibm.com/blogs/research/2019/08/ai-explainability-360.
- [20] "Making AI more trusted, by making it explainable." https://www.youtube.com/watch?v=dSYnNtH_8LY
- [21] Vincent, James. "Amazon Reportedly Scraps Internal AI Recruiting Tool That Was Biased against Women." The Verge, The Verge, 10 Oct. 2018, www.theverge.com/2018/10/10/17958784/ai-recruiting-tool-bias-amazon-report.
- [21] Pre-Employment Testing & Video Interviewing Platform | HireVue. www.hirevue.com/.
- [22]<https://www.washingtonpost.com/technology/2019/11/06/prominent-rights-group-files-federal-complaint-against-ai-hiring-firm-hirevue-citing-unfair-deceptive-practices/>
- [23] Center, Electronic Privacy Information. "EPIC - EPIC Alert 26.20." Electronic Privacy Information Center, epic.org/alert/epic_alert_26.20.html.

Citations

- [24] "IHuman." IMDb, IMDb.com, 13 Mar. 2020, www.imdb.com/title/tt11279794/.
- [25]The History of Artificial Intelligence. courses.cs.washington.edu/courses/csep590/06au/projects/history-ai.pdf.
- [26]Pasquinelli, Matteo, Machines That Morph Logic: Neural Networks ... - Glass Bead. www.glass-bead.org/article/machines-that-morph-logic/.
- [27]Libert, Barry, et al. "AI in the Boardroom: The Next Realm of Corporate Governance." MIT Sloan Management Review, 19 Oct. 2017, sloanreview.mit.edu/article/ai-in-the-boardroom-the-next-realm-of-corporate-governance/.
- [28] Pre-Employment Testing & Video Interviewing Platform | HireVue. www.hirevue.com/.
- [29]"What Is Recruiting Automation?" Entelo, www.entelo.com/recruiting-automation/.
- [30] "Bricolage." Oxford Reference, www.oxfordreference.com/view/10.1093/oi/authority.20110803095526906.
- [31] "This Is the Problem, the Solution, the Past and the Future." Sebastian Schmieg, sebastianschmieg.com/this-is-the-problem-the-solution-the-past-and-the-future/.
- [32]Baer, Tobias. Understand, Manage, and Prevent Algorithmic Bias: a Guide for Business Users and Data Scientists. Apress, 2019.
- [33]"Bias." bias_1 Noun - Definition, Pictures, Pronunciation and Usage Notes | Oxford Advanced Learner's Dictionary at OxfordLearnersDictionaries.com, www.oxfordlearnersdictionaries.com/definition/english/bias_1.
- [34]Kuehn B. M. (2017). Rooting out bias. eLife, 6, e32014. <https://doi.org/10.7554/eLife.32014>
- [35] "Written Testimony of Michal Kosinski, Assistant Professor Organizational Behavior Stanford Graduate School of Business (via VTC)." Written Testimony of Michal Kosinski, Assistant Professor Organizational Behavior Stanford Graduate School of Business (via VTC) | U.S. Equal Employment Opportunity Commission, www.eeoc.gov/meetings/meeting-october-13-2016-big-data-workplace-examining-implications-equal-employment/kosinski.
- [36] Schmelzer, Ron. "The Achilles' Heel Of AI." Forbes, Forbes Magazine, 7 Mar. 2019, www.forbes.com/sites/cognitiveworld/2019/03/07/the-achilles-heel-of-ai/.
- [37] Home, Lil Uzi Hurt at. "No Matter What Kind of Image I Upload, ImageNet Roulette, Which Categorizes People Based on an AI That Knows 2500 Tags, Only Sees Me as Black, Black African, Negroid or Negro. Some of the Other Possible Tags, for Example, Are 'Doctor,' 'Parent' or 'Handsome.'" Pic.twitter.com/wkjHPzl3kP." Twitter, Twitter, 18 Sept. 2019, twitter.com/lostblackboy/status/1174112872638689281?lang=en.
- [38] Paglen, Trevor, and Kate Crawford. "Excavating AI." -, www.excavating.ai/.
- [39] Knight, Will. "Forget Killer Robots-Bias Is the Real AI Danger." MIT Technology Review, MIT Technology Review, 2 Apr. 2020, www.technologyreview.com/2017/10/03/241956/forget-killer-robotsbias-is-the-real-ai-danger/.
- [40] Amini, Alexander, et al. "Uncovering and Mitigating Algorithmic Bias through Learned Latent Structure." Proceedings of the 2019 AAAI/ACM Conference on AI, Ethics, and Society, 2019, doi:10.1145/3306618.3314243.
- [41] "Talent Matching Platform." Pymetrics, www.pymetrics.ai/.
- [42] Ochigame, Rodrigo. "How Big Tech Manipulates Academia to Avoid Regulation." The Intercept, 20 Dec. 2019, theintercept.com/2019/12/20/mit-ethical-ai-artificial-intelligence/.
- [43. 44] Wikimedia Creative Commons 3.0
- [45] White House Warns on 'Overreach' in AI Regulation ... nationaltechnology.co.uk/White_House_Warns_On_Overreach_AI_Regulation.php.
- [46] IBM Research AI, "AI Fairness 360", cognitive-science.info/wp-content/uploads/2018/09/CSIG_krv-aif360-2018-09-20-1.pdf
- [47, 48] "Text Analytics." Microsoft Azure, azure.microsoft.com/en-us/services/cognitive-services/text-analytics/.
- [49]Ji-A MinHead Data Scientist at IdealJi-A Min is the Head Data Scientist at Ideal. With a Master's in Industrial-Organizational Psychology. "How Automated Candidate Screening Solves The 'Ignore' Problem." Ideal, 16 Oct. 2017, ideal.com/candidate-screening/.
- [50]Gershgorn, Dave. "Companies Are on the Hook If Their Hiring Algorithms Are Biased." Quartz, Quartz, 23 Oct. 2018, qz.com/1427621/companies-are-on-the-hook-if-their-hiring-algorithms-are-biased/.

Citations

- [52] "Unilever Saves on Recruiters by Using AI to Assess Job Interviews." The Guardian, Guardian News and Media, 25 Oct. 2019, www.theguardian.com/technology/2019/oct/25/unilever-saves-on-recruiters-by-using-ai-to-assess-job-interviews.
- [52] Inayatullah, Sohail, and Tamkang University. "Futures Studies: Theories and Methods." OpenMind, www.bbvaopenmind.com/en/articles/futures-studies-theories-and-methods/.
- [53] Dunne & Raby. dunneandraby.co.uk/content/projects., Dunne, Anthony, and Fiona Raby. Speculative Everything: Design, Fiction, and Social Dreaming. MIT, 2014.
- [54] Latour, Bruno. "Technology Is Society Made Durable." Design: Critical and Primary Sources, 2016, doi:10.5040/9781474282901.0013.
- [55] Alameddine, Yasmin. "Is AI Preventing Bias in Recruitment-or Creating It?" Medium, Bias In AI, 21 Feb. 2020, medium.com/bias-in-ai/is-ai-preventing-bias-in-recruitment-or-creating-it-cb7e4829f410.
- [56] [https://www.theguardian.com/technology/2019/oct/25/unilever-saves-on-recruiters-by-using-ai-to-assess-job-interviews](http://www.theguardian.com/technology/2019/oct/25/unilever-saves-on-recruiters-by-using-ai-to-assess-job-interviews)

General References

AI-Rodhan, Nayef R. F., Carma, F. González, Zoe Hallington, and Ann Uldall. 2012. There's a future: visions for a better world. 'Critical futures definition'

Esch, Patrick Van, and J. Stewart Black. "Factors That Influence New Generation Candidates to Engage with and Complete Digital, AI-Enabled Recruiting." *Business Horizons*, vol. 62, no. 6, 2019, pp. 729–739., doi:10.1016/j.bushor.2019.07.004.

Roy, Ria. "Corporate Recruiting Opening Its Doors to AI: The Performance Opportunity?" *Performance Improvement*, vol. 56, no. 10, 2017, pp. 43–44., doi:10.1002/pfi.21747.

Pérez-Zapata, Oscar, et al. "Knowledge Work Intensification and Self-Management: the Autonomy Paradox." *Work Organisation, Labour & Globalisation*, vol. 10, no. 2, 2016, p. 27., doi:10.13169/workorgalaboglob.10.2.0027.

"When People Don't Trust Algorithms." *How AI Is Transforming the Organization*, 2020, doi:10.7551/mitpress/12588.003.0018."

Euchner, Jim. "Little Ai, Big AI—Good AI, Bad AI." *Research-Technology Management*, vol. 62, no. 3, 2019, pp. 10–12., doi:10.1080/08956308.2019.1587280.

Theodorou, Andreas, and Virginia Dignum. "Towards Ethical and Socio-Legal Governance in AI." *Nature Machine Intelligence*, vol. 2, no. 1, 2020, pp. 10–12., doi:10.1038/s42256-019-0136-y.

"Artificial Intelligence, Automation, and Work." *The Economics of Artificial Intelligence*, 2019, pp. 197–236., doi:10.7208/chicago/9780226613475.003.0008.

Albert, Edward Tristram. "AI in Talent Acquisition: a Review of AI-Applications Used in Recruitment and Selection." *Strategic HR Review*, vol. 18, no. 5, 2019, pp. 215–221., doi:10.1108/shr-04-2019-0024.

Miller, Tony. *The New World of Human Resources and Employment: How Artificial Intelligence and Process Redesign Is Driving Dramatic Change*. Business Expert Press, 2019.

Collier, Katrina. *The Robot-Proof Recruiter: a Survival Guide for Recruitment and Sourcing Professionals*. Kogan Page Limited, 2019.

Hagendorff, Thilo. "The Ethics of AI Ethics: An Evaluation of Guidelines." *Minds and Machines*, vol. 30, no. 1, 2020, pp. 99–120., doi:10.1007/s11023-020-09517-8.

Dunne, Anthony, and Fiona Raby. *Speculative Everything: Design, Fiction, and Social Dreaming*. MIT, 2014.

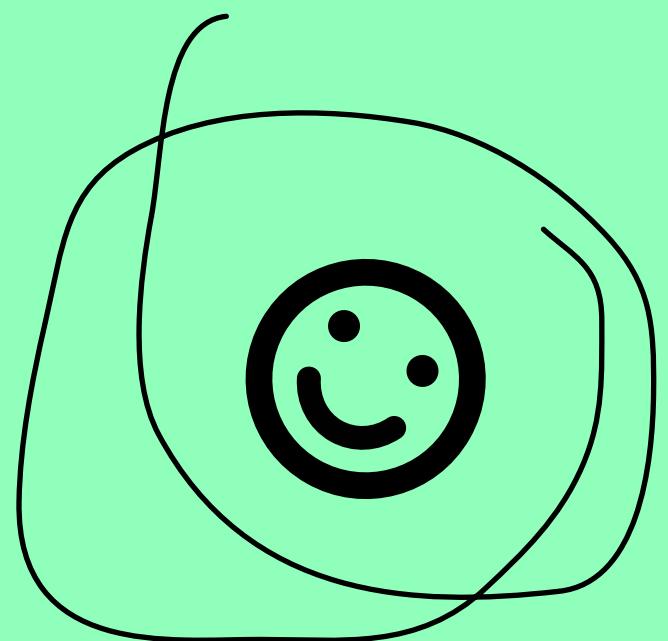
Bridle, James. *New Dark Age: Technology and the End of the Future*. Verso, 2019.

Manovich, Lev. *AI Aesthetics*. Strelka Press, 2018.

Icons

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