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The future effects of generative AI on relationships in society between companies, governments, and citizens

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Abstract

Generative artificial intelligence (genAI) is one of the fastest-expanding technologies in the last few years. Such a disruptive technology can lead to societal change and challenge existing relationships between governments, companies, and citizens. This thesis contributes to the goal of achieving the best possible future regarding genAI by creating four future scenarios, a method used in futures studies. The scenarios each sit at a different intersection of high or low genAI acceptance, and light or heavy genAI regulation. These scenarios, serving as possible futures, help demonstrate and explore how genAI's positive effects and opportunities can be optimized while minimizing its vulnerabilities and challenges, taking as scope the relationships between governments, companies, and citizens. This study shows how achieving the best possible future regarding genAI requires a collaborative approach between these three societal stakeholders. It must be based on trust and shared ethical values. Implementing a dynamic lawmaking process, introducing independent third parties for algorithm monitoring, and establishing citizen feedback channels are examples of ways genAI's future can be taken in the right direction.

Introduction

Generative artificial intelligence (genAI) has experienced a huge boost in popularity, capability, and usage since the early 2020s. OpenAI's ChatGPT introduced the general public to this transformative technology when it went public in 2022 [1]. GenAI models, such as ChatGPT, Midjourney, or Bard, take a prompt as input and generate content that can be hard to distinguish from human content, based on recognized patterns from their training data. These outputs can be unimodal, such as text, video, images, or audio, but can also be multimodal and combine multiple of these output types at once [2].

GenAI models are extremely powerful tools with the ability to alter creativity, creation, decision-making processes, and communication, as well as boost productivity and efficiency [1]. These models can be used in many fields, such as government and the public sector, healthcare, law enforcement, and corporations. Even though genAI has the potential to positively affect the lives of many, the technology also warrants discussion regarding its potential negative societal and ethical implications [3]. Regardless, new technology, especially one as disruptive as genAI, has been shown to lead to societal change and challenge existing relationships between governments, companies, and citizens [4][5][6]. I have visualized this in Figure 1.
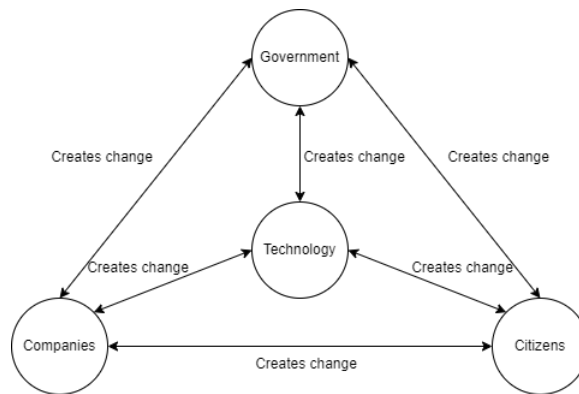

Figure 1: The influence of technology on relationships between government, companies, and citizens.

Furthermore, these parties have different interests, stakes, and values when it comes to their genAI usage. In this light, it is crucial to critically examine how genAI can affect these relationships in society in the future, specifically between these three major societal groups. Generative AI poses many challenges that can shift future relationships between governments, companies, and citizens. GenAI's governance and regulation are challenging, because of, for example, information asymmetry and the disruptiveness of the technology, transparency and explainability, and liability and accountability. Its acceptance is also an important and challenging factor, which can be seen in, for example, trust in AI and the interplay between literacy, anxiety, and the acceptance of AI technologies. In my thesis, I will analyze the possible future implications of the technology on these relationships in the Netherlands to help us determine the best way to move forward at the moment to ensure we create a world where the positive effects of genAI are maximized for each of the three groups while minimizing its challenges. These avenues will contribute to the overall goal that my thesis aims to take us closer to:

How do we achieve the best possible future regarding generative artificial intelligence?

I consider the 'best possible future' one where genAI's positive effects and the opportunities it brings are optimized, while its vulnerabilities and challenges are minimized. To explore genAI's various possible future effects, I will employ a futures studies approach. In the field of futures studies, futurists focus on exploring alternative futures to help policymakers make informed decisions in the present day and help society prepare for multiple alternative futures [7]. Since the future is uncertain, this approach of considering multiple possible futures regarding genAI will help me get closer to the goal of my thesis. I will elaborate on this in the next section.

Methods

In this thesis, I will focus on three societal stakeholders: companies, governments, and citizens. I will explore how we can achieve the best possible future regarding genAI and specifically focus on the relationships between these stakeholders. This will be done using four different future scenarios that serve to identify which opportunities genAI brings to companies, governments, and citizens that should be promoted in our society while minimizing its negative aspects. As mentioned in the introduction, one of the most challenging and pressing matters of the development of genAI is its governance and regulation [8]. I will go over three different aspects that highlight why this area is undeniably important yet challenging in determining the future of genAI. The three aspects are information asymmetry and disruptiveness of technology, transparency and explainability, and liability and accountability. Another challenging factor that influences how genAI will develop in the future is the level of acceptance of genAI. How much people accept genAI is known to be positively associated with, for example, usage intention [9]. I will cover why the acceptance of AI technologies in the future is uncertain and challenging, yet a major factor in its development.

I will now further elaborate on these challenging aspects that could affect the relationships between companies, governments, and citizens in the future. I will then give theoretical background about my chosen method of futures studies and scenario planning, and elaborate on the resulting model for this study.

Challenges of genAI governance

Information asymmetry and disruptiveness of technology

The first aspect that makes regulating genAI difficult has to do with information asymmetry and the disruptiveness of new technology. Given that technological change is exponential, we can safely assume new technology, including generative AI, will continue to develop in the coming years at a massive rate [10]. Given that technological change leads to societal change, this means that the rapid development of genAI will have consequences for society and the relationships between the different actors. Generative AI

can be labeled a disruptive autonomous technology, and as such warrants analysis regarding the way it enacts societal change [6].

One direction in which information asymmetry becomes apparent is between the government and tech companies. Big Tech companies and AI developers such as Google, Apple, Microsoft, and Meta have a huge advantage in information, understanding, and resources related to genAI compared to governments [11]. Their products, innovations, and considerable political influence effectively decide what, how, and to what extent genAI is regulated by governments [12].

For governments, it is challenging to have a new technology advancing so rapidly. If technological change were linear, regulating it would be much easier as they could create laws and regulations as the technology emerges. However, governments are now put in a challenging position since they must manage the scale and speed of this technological transition and its societal effects [10][11].

In AI legislation, due to information asymmetries and rapid innovation, laws are often too general and not specific enough to control a certain technology such as genAI [3][13]. In the European Union, the AI Act has made a good start in this direction, providing guidelines that AI algorithms should adhere to [14]. However, there is still room for interpretability, since the government wants to allow room for programmers to experiment and innovate. The trade-off here is that there is room for programmers to shift accountability and responsibility for the way the system will behave and the consequences it might have.

The way citizens deal with (rapid) technological change and innovation can be described through the technology adoption lifecycle, created by Everett Rogers [15]. According to this theory, every citizen can be classified as an innovator, early adopter, early majority, late majority, or laggard. Here, the earlier someone adopts a new technology, genAI in this case, the better they deal with rapid technological change. Since early adopters learn how to use and comprehend a new technology quicker and easier, they have a distinct advantage over later adopters and laggards in terms of digital literacy and economic opportunities.

The disruptiveness of genAI further adds to this information asymmetry as the technology enters more industries, changes job markets, necessitates the acquisition of new skills, and makes certain existing occupations redundant. Citizens must constantly learn and adjust which can be difficult and unfair. Socioeconomic gaps may widen as a result of underemployment or unemployment among those unable to keep up with these quick changes. This means governments must develop policies and safety nets to minimize these negative implications for the affected citizens. In addition, some sectors will feel the effects of genAI more than others, requiring governments to develop specific regulations for certain industries while not deviating too much between sectors. This is not an easy task, further adding to the challenges of

genAI governance.

Transparency and explainability

The second aspect that makes governing and regulating genAI hard is the lack of transparency and explainability that is often present in opaque machine learning algorithms that form the basis of generative AI [11]. Opaque algorithms, which can be defined as algorithms for which it is unclear how they arrived at a certain output, pose a challenge to AI systems' governance [16]. These limitations can manifest themselves in the following ways.

Many companies have developers and experts who design machine learning algorithms. Still, even for them, it is impossible to interpret the output of the algorithms from the input, since it is such a black box. However, if they were to design the algorithms to be more transparent, that would reduce their complexity, which limits accuracy and performance [17]. Since companies clearly have an interest in optimized profit, limited performance in exchange for explainability is not a favorable trade-off.

These developments are happening even though governments have made laws mandating certain levels of transparency and explainability in machine learning algorithms. Examples of these rights can be found in the EU General Data Protection Regulation (GDPR), where the 'right to explanation' and 'right to be forgotten' are red threads running through the regulation [18]. These rights are supposed to give data subjects access to the personal data collected about them. Articles 13 and 14 even state that, when a data subject is profiled and potentially discriminated against as a result, they have the right to 'meaningful information about the logic involved', thus requiring algorithmic explanation. The underlying reasoning for these rights is the right to nondiscrimination, which is embedded in the foundations of the EU and can be found in Article 21 of the Charter of Fundamental Rights of the European Union, Article 14 of the European Convention on Human Rights, and in Articles 18–25 of the Treaty on the Functioning of the European Union [19]. Thus, opaque algorithms as described above are a big limitation of the GDPR. If an algorithm cannot be explained even by experts, these rights cannot be safeguarded.

Another obstacle to explainability is that developers often keep their algorithms intentionally opaque for security purposes, and to protect the company's trade secrets. Legally, this is justified because of laws surrounding intellectual property rights. Furthermore, the complexity of the extensive datasets used by machine learning algorithms makes it nearly impossible to identify and remove all instances of sensitive categories of personal data, which again leads back to the GDPR [19][20].

This leaves citizens caught in the middle of these contrasting concerns; the GDPR and the government are supposed to protect their personal data, but in practice companies often do not or cannot fully live up to those

promises. Additionally, the GDPR's 'right to explanation' is unlikely to inform or empower people because most citizens lack the technical literacy or the financial means to pay for an expert to help them understand these explanations [17][20]. This perceived illiteracy towards AI-powered tools and algorithms contributes to weariness regarding AI, which will be covered in the section on challenges of AI acceptance.

Liability and accountability

The third challenging aspect of regulating genAI is the difficulty in assigning liability and accountability to the results of machine learning decisions. One of the reasons is that these decisions are data-driven and subject to large variations even with small input changes which makes them unpredictable. This raises questions about the difficulty of determining who is responsible for damages caused by software flaws, because humans cannot regulate the behavior of AI systems. Programmers and manufacturers frequently are unable to predict the inputs and design rules that could produce harmful or discriminatory results, which is known as the black box problem [21][22][23]. Since there are always multiple stakeholders involved with the creation, distribution, and usage of AI systems, known as the problem of many hands, they end up pointing fingers at each other and refusing to take responsibility for the output or outcome of such a system. The end user of a product usually bears the majority of this risk [24]. Another aspect that adds to the difficulty in assigning liability and accountability is data governance, mostly within companies. Several challenges hinder an organization's control over data flows within their company and as such, data is often fragmented and spread over multiple systems, each with a separate party governing them. The lack of interoperability between these fragmented systems adds to this problem. This fragmentation of the data impedes effective accountability and the ability to determine causation and liability for AI-driven decisions [25].

Challenges of genAI acceptance

Trust in AI

On an individual level, multiple factors decide whether a user trusts a (gen)AI technology. Trust is important in measuring a technology's acceptance [26]. A study by Choung et al. has shown that both human-like trust in AI and functionality trust in AI are relevant in studying trust in AI, where the first dimension deals with the ethical values and social and cultural values that inform the algorithms and the AI technology's design, and the second dimension covers the technological features' competence and knowledge [27]. Intuitively, when measuring trust in AI, it would make sense

to only classify it in the trust in technology dimension, however, that fails to recognize that AI has a greater level of autonomy and humanness and thus needs to be examined through a different lens [27]. Additionally, human attributes, motivations, and reasoning are often assigned to AI technologies, anthropomorphizing them and assigning high levels of initial trust and expectations to them [28].

The first dimension, human-like trust in AI, has to do with aspects such as transparency and explainability, because people are more likely to trust an AI technology if the algorithm is explainable and transparent [29]. Other concepts that influence human-like trust in AI are privacy concerns, bias, and fairness, but also the idea of emotional trust in an AI product. The second dimension, functionality trust in AI, predicts the perceived usefulness, perceived ease of use, user attitude, and usage intention, which all combined predict trust. The combination of all these factors makes it difficult to ensure complete trust in an AI product since it must both be functionally sound and easy to use, but also 'emotionally' trustworthy.

On a societal level, perpetuated by (social) media, there is a growing worry that genAI will do several things, such as cause mis- and disinformation, generate malicious content, amplify bias and discrimination, attack your data privacy, perform automated cyber-attacks, perform identity theft and social engineering, manipulate multimedia and create deepfakes, and enable financial fraud [30]. Even though not all of these potential nefarious applications of genAI are grounded or realistic, the fear of them is very real. This fear can spread quickly and thus gaining widespread trust in genAI among all groups in society is difficult, especially when these doom scenarios are given so much attention online and in the news.

Interplay between literacy, anxiety, and acceptance of genAI technologies

Trust is not the only factor influencing the acceptance of (gen)AI. In a study by Schiavo et al., the interplay between AI literacy, AI anxiety, and AI acceptance was examined [31]. They found that AI anxiety harms AI acceptance whereas AI literacy has a positive effect. Moreover, they found that improving AI literacy reduces fear of AI, which in turn raises acceptance of it. Additionally, AI literacy improved people's perceptions of AI-based technology's usefulness and ease of use, which helped to increase its general adoption. Their study also suggests a causal relationship between AI literacy and AI anxiety, highlighting the importance of citizens becoming familiar with AI products and thus increasing their trust in these technologies. In the case of genAI, this might be done in schools through AI literacy workshops and classes, which made students more confident and understanding of the technology [32]. However, other groups in society might be harder to reach, making this another challenge in AI acceptance.

Futures studies

In the field of futures studies, futurists focus on exploring alternative futures. More specifically, they explore possible, probable, and preferable futures to help policymakers make informed decisions in the present day and help society prepare for multiple alternative futures [7]. In futures studies, scenario planning is one of the most used methodologies. The distinction between the possible, the probable, and the preferable is also commonly applied in scenario planning, although there is no definitive consensus regarding scenario typology [33]. Börjeson et al. proposed a categorization for scenario planning that roughly corresponds with the earlier division [34]. Their categories are explorative ('What can happen?') which corresponds with the possible, predictive ('What will happen?') which corresponds with the probable, and normative ('How can a specific target be reached?') which corresponds with the preferable. These categories then branch out to visualize the two ways these questions could be answered, illustrated in Figure 2.

Figure 2: Scenario categories proposed by Börjeson et al. [34]

The two types of predictive scenarios each answer the question 'What will happen?' in their own way. Forecasts try to predict what will happen given that a certain likely development happens. What-if scenarios try to answer what will happen if a specified event unfolds.
When it comes to explorative scenarios, external scenarios look at what can happen if we look at the development of external factors, whereas strategic scenarios try to answer what can happen if we act in a certain way.
Normative scenarios can be divided into preserving and transforming scenarios. Preserving scenarios look at how a certain goal can be reached if we adjust to the current situation. Transforming scenarios tries to answer how a goal can be reached if the current system is preventing the necessary

changes.

I will also create future scenarios for my study and specifically take the strategic explorative approach. This approach allows me to look at a variety of possible situations to estimate how genAI could influence the relationships in society between governments, companies, and citizens, rather than one specific development in the near future like in predictive scenarios. Since we don't know how genAI will evolve, an explorative approach allows me to start my scope in possible futures rather than the present. Furthermore, different groups in society have varying views on the development of genAI, so exploring multiple possible futures allows me to find out what the possible relationships between the societal stakeholders could be regarding the different scenarios.

The specialization to strategic explorative scenarios follows from my chosen scenario axes; I want to examine the impact of genAI on society, given certain policy decisions made by the government. These policy decisions in turn influence and are influenced by strategic decisions by companies as well, and citizens are also impacted by governments' and companies' policy decisions. This is precisely the aim of strategic explorative scenarios, 'to describe a range of possible consequences of strategic decisions' [34]. External factors are also at play, but not the driving force as in external explorative scenarios.

Model

In this study, I will explore four future scenarios regarding genAI, based on two axes. These axes are based on uncertainties since the way these aspects will develop over the next 20 to 30 years is unknown. I have already elaborated on two challenging aspects of genAI, governance and acceptance, for which we also cannot say for certain how they will develop in the coming years. These challenges are uncertainties and will serve as the axes in this study. One axis deals with the levels of genAI regulation and governance, while the other axis deals with the level of genAI acceptance. Governance of genAI could range from heavy regulation to light regulation, and acceptance of genAI could range from low acceptance to high acceptance. This leads to Figure 3. When exploring the scenarios further, I will first do a more general overview of a scenario and cover its legal, economic, and social aspects. These aspects are common macro-environmental factors that are used in, for example, PESTLE methodology [35]. This methodology addresses the political (P), economic (E), social (S), technological (T), legal (L), and environmental (E) implications of a certain topic, usually to help an organization specify its strategy. I will use this method and specifically focus on the legal, economic, and social aspects. I will then dive into the motivations for each of the three groups in more detail.
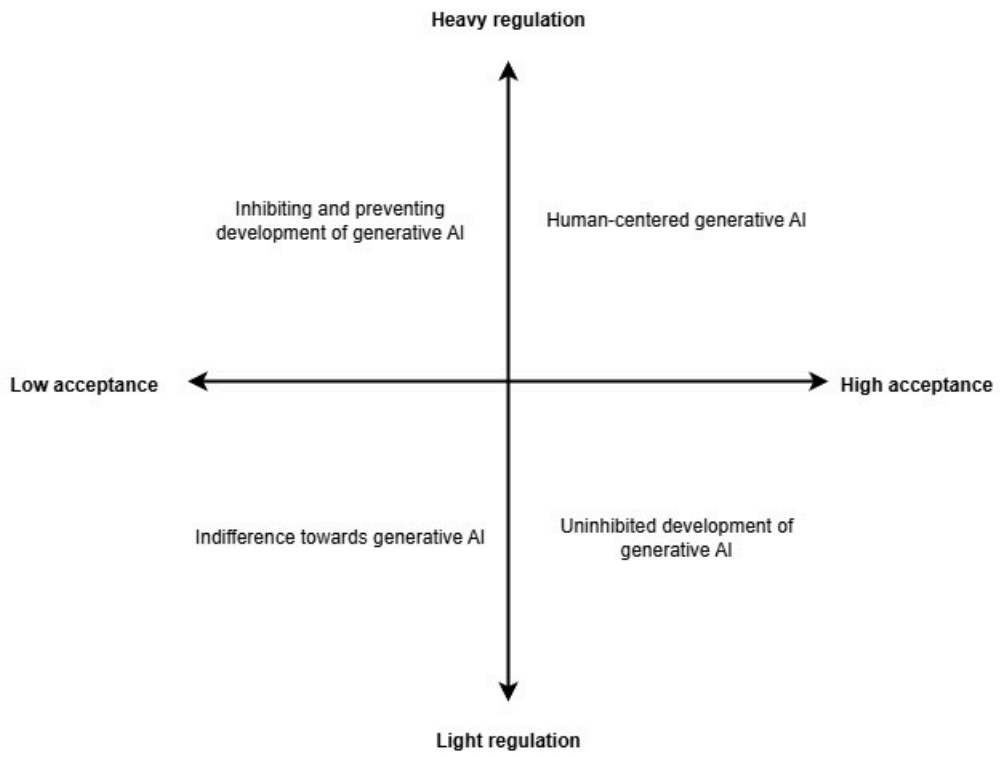
Heavy regulation

Inhibiting and preventing
development of generative AI

Human-centered generative AI

Low acceptance

High acceptance

Indifference towards generative AI

Uninhibited development of
generative AI

Light regulation

Figure 3: Scenario matrix

Future scenarios

In this chapter, four different possible future scenarios will be described and elaborated on, taking as a scope the relationship between governments, companies, and citizens. These future scenarios are a way to explore the possible future implications of genAI on these relationships to help us determine the best way to move forward and ensure we create a world where the positive effects of genAI are maximized for each of the three groups. In this light, not every scenario will be elaborated on in the same manner, since not every scenario is as conducive to the goal of my thesis. The four scenarios, shown in Figure 3, are as follows: human-centered generative AI, inhibiting and preventing development of generative AI, uninhibited development of generative AI, and indifference towards generative AI. I will now describe each of the four scenarios.

Human-centered generative AI (heavy regulation, high acceptance)

The first scenario is situated in the upper right quadrant of the scenario matrix, at the intersection of heavy regulation and high acceptance of genAI. I have named this scenario 'human-centered generative AI'. I will now explore this possible future.

Macro-environmental movements

For this first subsection, I will take three aspects of a PESTLE analysis (legal, economic, and social) as a scope to broadly analyze how this scenario would look [35]. These aspects are common macro-environmental factors that help me frame my overview of these scenarios. I will then write a short conclusion detailing which aspects are the driving forces for this scenario, which will narrow my focus in the following subsections.

Legal

In this possible future scenario, substantial legal changes would be made to ensure that genAI is used responsibly and ethically while cultivating the

technology's potential. Governments and EU regulatory bodies would push for ethical values to be protected and embedded in genAI-powered products and algorithms as much as possible. Globally, there seems to be a consensus regarding what these values should be according to a comparative analysis by Jobin et al. (2019), they are: transparency, justice and fairness, non-maleficence, responsibility, and privacy [36]. Other values often included are respect for human autonomy, prevention of harm, and explainability [37]. Promoting these values would be achieved by implementing stricter laws and regulations, in addition to and improving upon, those currently present in the EU [3][13].

This shift will not go unnoticed by (tech) companies, however. They will want to use their power and influence to tone down these regulations as much as possible because regulations make it harder for them to innovate and develop new genAI products [12]. Big Tech companies have done this before, using their considerable lobbying and political power to tone down the extent to which genAI would be regulated in the AI Act [14][38]. Big Tech is a common denominator for a group of companies that control large and important online platforms [12]. Examples of Big Tech include Amazon, Apple, Alphabet, Meta, and Microsoft. These companies have also funded and contributed to AI (ethics) research, while at the same time benefiting from said research [12]. They have also tried to push for self-regulation by companies rather than government regulation [39]. These aspects combined would suggest that tech companies, especially Big Tech, would try to prevent further and stricter regulation from happening.

Given that public opinion and acceptance of genAI would be favorable in this scenario, citizens would likely be glad to see further regulations being made, as people are excited about the potential of genAI but also aware of the technology's possible detrimental effects on society [12][40][41]. The public would support promoting and protecting important human values in these laws as this directly impacts their daily lives.

Economic

In this scenario, the government is faced with a trade-off between human-centered genAI and its associated safety, and attracting companies that invest in AI and reaping the economic benefits [42]. If choosing the former, The Netherlands could see its global economic position worsen because of the stricter laws and regulations. Companies might settle elsewhere, where regulations are less strict. Furthermore, since approaches to regulating genAI differ massively from one country to another, international coordination and collaboration become harder [42].

With proper legislation, the market would be regulated more fairly so that Big Tech can still innovate and develop, but smaller companies and start-ups are also encouraged and supported [43]. New products and services would

be created ethically and responsibly, with societal values and the promotion of human rights in mind, rather than avoiding blatant risks to human values [44].

For citizens, the economic effects of this scenario can be seen in the labor market. There is currently no clear consensus on whether genAI will lead to job displacement or the creation of new job opportunities [42]. However, certain groups of employees will surely be impacted by the development and involvement of genAI, as there may be a significant reallocation of employment in the labor market [45]. To ensure this transition goes smoothly, employers and governments would need to set safeguards in place to ensure that nobody is impacted disproportionately. Furthermore, the potential positive economic benefits of using genAI in the workplace would need to extend to all members of society equitably and inclusively.

Social

Governments would be focused on improving the social dialogue surrounding genAI and promoting genAI literacy to ensure citizens are knowledgeable about the potential positive and negative implications [45]. Furthermore, they might provide social safety nets to those negatively affected by genAI disrupting the labor market. The government might also be actively working on reducing the environmental impact of genAI as this is an important aspect of genAI that is too often ignored [46][1].

Companies might focus on creating products that benefit all members of society, for example by creating products that improve their daily lives. Surveys have shown that this would make the public think more highly of a company, be more likely to buy their products, or work for that company [47].

Citizens' increased awareness and literacy of genAI would lead to them being more empowered when it comes to AI knowledge. Public campaigns would diminish AI anxiety and increase overall acceptance and support of the technology [31].

Conclusion

Based on this partial PESTLE analysis, I can conclude that there is a lot of work to be done on the legal side. Current regulations would have to be updated, and new laws introduced, likely in collaboration with the EU. The main challenge here lies in aligning the EU's vision on genAI legislation with that of the Netherlands. In this scenario, the shift toward heavier regulation stems from genAI's widespread acceptance. Society sees the potential and opportunities that genAI brings, but wants to ensure it is developed in a human-centered and responsible manner.

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Implications for the government

In this scenario, the general public's acceptance of genAI would be high, and attitudes towards it would be favorable, thus driving demand for genAI-powered products and services. High acceptance could be achieved through, for example, increasing genAI literacy such that citizens understand how to use genAI, and what its possibilities and risks are [31]. This could be done in schools via genAI literacy workshops and classes, or through campaigns funded by governments and companies [32]. These programs would emphasize how regulation and laws safeguard the rights and welfare of citizens while bringing attention to the potential and limitations of genAI. Public campaigns might demystify genAI and demonstrate how it can be applied responsibly to improve society. The public's diminished anxiety about genAI would increase the acceptance of AI technology.

At the same time, governments would push for ethical values such as transparency, justice and fairness, non-maleficence, responsibility, privacy, respect for human autonomy, prevention of harm, and explainability to be protected and embedded in genAI-powered products and algorithms as much as possible [36][37]. These values, in turn, go hand in hand with the general public's trust in genAI. Promoting these values would be achieved by implementing stricter laws and regulations, in addition to, and improving upon, those currently present in the EU such as the GDPR, AI Act (AIA), Digital Services Act (DSA), AI Liability Directive (AILD), and Product Liability Directive (PLD) [18][14][48][49][50].

EU law is currently not sufficiently equipped to deal with generative AI [3][13]. For example, genAI can produce discriminatory output. The AI Act takes a proactive stance to combat this by requiring the mitigation of biases in input and training data, but this is not explicit enough to minimize genAI discrimination [14][3]. Lawmakers from the Netherlands and the EU would need to update current laws to explicitly ban new forms of discrimination output by genAI, as these outputs can perpetuate harmful stereotypes but do not constitute 'tangible' disadvantages and thus are not covered by the AIA, PLD, or AILD [14][50][49][13]. The immaterial harms that genAI can cause should be included in the scope of these legislations as the consequences can be severe.

Policymakers could also introduce rules to get more grip on the technology, by introducing auditing and testing for bias in genAI output [3]. These audits could be conducted by independent third parties, as this would increase accountability and expose and mitigate systemic risks for high-risk AI systems [13].

Randomizing the selection of members of minority groups in genAI outputs is another tactic to promote equitable representation of these groups, similar to how a search engine could 'shuffle' results according to important

parameters [51].

Another method to minimize genAI outputting biased and discriminatory content is using a wide range of content, from conventional to extremely inclusive, to train or fine-tune genAI [52]. Legislation might mandate that genAI is designed to give deployers the option to select the level of inclusivity they want while keeping a baseline of inclusivity and removing offensive or discriminating content. This way, it is possible to maintain minimal ethical and legal standards while balancing deployers' preferences and societal norms [3].

Another potential requirement for genAI providers and deployers could be to report testing results regarding biases present in their data, and actions taken to prevent or minimize those biases. This would inform individuals about the potential harms a system or model might cause [13].

Another improvement to the AIA would be to change the threshold for genAI models with systemic risks, which is when a system could cause a major accident or threaten public health and safety [14][13]. Currently, this threshold lies at 10^{25} FLOPS (floating point operations per second), which only includes models such as Gemini, GPT-4, and Llama 3.1, but excludes models available to the public such as GPT-3.5. However, this model and similar models still pose systemic risks, which suggests the threshold should be lowered. Additionally, a criterion like the total number of end users could be considered to constitute a system posing systemic risks [13].

Furthermore, genAI is currently not included in the high-risk categories of the AIA, even though it has significant systemic risks for society and individuals [14][13]. As such, the regulations that are in place for high-risk categories do not apply to genAI. Adding genAI to this list would help regulate it better by subjecting it to additional requirements.

Finally, the carbon footprint of genAI cannot be overstated and it should be a priority for governments to introduce legislation that requires genAI providers to measure and reduce their environmental impact [46][53].

Implications for companies

For companies, this scenario of high acceptance and heavy legislation is one where the usage and development of genAI is highly regulated, yet encouraged and supported because of public acceptance of the technology. While the societal effects of ethical innovation would be positive, it could be a great burden to companies.

The primary reason is that regulation is known to reduce both innovation and the adoption of AI technologies [42][54][55]. Additionally, having to comply with new standards is both complicated and expensive for firms since they have to hire compliance officers, strategy managers, and other associated roles [54]. This comes at the expense of hiring new employees and educating existing staff members.

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On the other side, regulations encourage companies to be more mindful and concerned with transparency, explainability, safety, and other related values [54]. Also, even though firms will innovate less, when they do their innovations are more likely to be bigger and more radical [55].

In this scenario, there is a distinct difference between bigger and smaller players in the genAI market. Big Tech companies would likely do everything in their power to water down the regulations to keep their market dominance and avoid having to comply with stricter laws, as they have done in the past [12][42]. Big Tech has also been known to participate in anti-competitive practices in order to keep market dominance, lock out competitors, and inhibit innovation [12][56]. This past behavior suggests that these companies would not welcome stricter regulations that tone down their power and lend more space to smaller players.

Without stricter regulations, smaller companies would have difficulty entering the market because developing genAI models requires vast resources [57]. In order to train a machine learning model, they need the proper hardware, software, data, and expertise [58]. GenAI models in particular need specialized chips and a significant amount of computing power over a longer period of time [42]. These entry barriers could be lessened with proper legislation, leading to a more leveled playing field for parties looking to compete with Big Tech [42]. This would benefit society as additional healthy competition would naturally lead to innovation. New products and services would ideally be created with high standards regarding human rights and values, instead of merely being risk-avoidant [44]. Furthermore, companies developing products, models, and services that improve citizens' daily lives might be viewed more positively. The public would also be more likely to purchase from them or work for them [47]. By using genAI to solve issues that matter most to the public, not only would trust in the company increase, but the overall societal acceptance of AI would too [59].

Implications for citizens

In this scenario, citizens would be happy that their rights are protected in a landscape with much optimism about the future of genAI. Individuals would support the inclusion of ethical values such as transparency, justice and fairness, non-maleficence, responsibility, privacy, respect for human autonomy, prevention of harm, and explainability in legislative measures as this protects them and ensures genAI products can improve their lives in a meaningful way without compromise [36][37]. With this general acceptance and embracing of genAI technology, some might fear this will impact their jobs and livelihoods. Presumably, workers' rights would be well-protected with stricter laws surrounding genAI in the workplace and the way this can be used.

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A different implication for citizens would be that genAI technology and products might not be as accessible as they once were or could be. Innovations from other nations might be inaccessible in the Netherlands due to stricter laws which could lead to frustration if many others are using it.

This scenario would also encourage individuals to become more aware and literate about genAI technology and its positive and negative effects, which in turn diminishes AI anxiety [31].

Implications on the relationships between government, companies, and citizens

Citizens' trust in the government would be essential for this scenario, as people must believe that the government is acting in their best interest when designing and implementing regulations around genAI. This could create a positive cycle where high public acceptance of genAI would lead to more emphasis on its development, which would then lead to more regulations to ensure its safe use. In turn, this would build greater trust in both the technology and the government, leading to even higher acceptance of AI over time. However, there is also the potential for frustration if citizens feel that overly strict regulations stifle innovation. This could create tension, with some people feeling that beneficial AI products are being kept out of the market due to slow regulatory processes.

Furthermore, the government would need to take a proactive role, not only in regulating genAI but also in educating the public about why these regulations are necessary. This could involve awareness programs to help citizens understand the benefits and risks of genAI, ensuring transparency and maintaining trust.

On the other hand, companies would need to gain consumers' trust by demonstrating that their genAI products are designed with the public's best interests in mind. By offering products that genuinely improve daily life and benefit all layers of society, companies would earn a positive reputation. Additionally, companies that invest in training their employees on AI skills and adapt their operations to integrate genAI without mass layoffs would be viewed favorably.

Companies' relationship with the government may feel tense in this scenario. Strict regulations could slow down innovation and lead to frustration. Larger companies would likely find it easier to handle the regulations due to more extensive resources, but even they might resist laws that make it harder for them to earn a profit. Smaller companies may push the government for policies that ease market entry, which could lead to collaboration between the government and smaller firms as they work together to keep innovating while still ensuring compliance with the regulations.

Moreover, both the government and companies could partner to promote genAI awareness and training programs for citizens, either through national

campaigns or initiatives led by employers. Ultimately, citizens would benefit the most from this scenario, as they would be well-protected by regulations. The government would maintain trust and oversight, but economically the Netherlands would do better with fewer regulations. Companies would generally enjoy high acceptance rates but struggle to keep up the pace of innovation.

Promoting or eliminating the positive or negative implications of 'human-centered generative AI'

As long as trust in the government is established, citizens would likely support high regulations on genAI as long as they see benefits in their daily lives, such as feeling protected or informed. Civil society organizations and advocacy groups could partner with the government to raise awareness about the importance of responsible genAI and to hold both the government and companies accountable. If frustration arises over potentially slow innovation due to regulations, citizens might push for more flexible policies, especially if they feel useful genAI applications are unnecessarily delayed. The government would need to update and expand laws and regulations regularly to promote ethical and human-centered genAI. This leaves the government in the position to continually update these laws, requiring the lawmaking process to become more dynamic. When updating legislation, the government could be advised by ethicists, civil society organizations, and technologists to ensure these updates properly represent societal values. This would involve transparency measures, such as explaining the purpose of specific regulations and creating public education programs on genAI's benefits and risks. To further enhance public trust, the government might establish feedback channels, allowing citizens to voice concerns and suggest improvements.

Additionally, a new regulatory body could be introduced tasked with monitoring, auditing, overseeing, and evaluating genAI technologies to make sure they adhere to ethical standards. Audits could be quite strict, requiring algorithms to be checked and approved by this body. Fines or legal action could serve as a way to enforce compliance with genAI laws by companies and organizations.

Furthermore, citizens would generally support companies that demonstrate ethical genAI practices and contribute positively to society. Consumers would likely favor businesses that use genAI responsibly, emphasizing products that improve quality of life while respecting data privacy and social well-being. Citizens could also advocate for fair competition and accessible genAI products, encouraging companies to provide affordable and beneficial genAI solutions across society. In turn, companies would demonstrate that their genAI products are designed with the public's best interests at heart. This could involve transparency about data usage, privacy protection, and the social benefits of their products, such as improved accessibility for ev-

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eryone or public service support. Additionally, companies might implement genAI training programs for employees to support responsible genAI adoption. To maintain high public acceptance, companies would need to provide clear information and openly address any genAI concerns consumers may have.

When it comes to the strict regulations in place, companies may lobby for adjustments that ensure regulations don't stifle innovation. Larger companies that have the resources to meet high compliance standards, would likely push for regulations that promote public safety and transparency without slowing product development. On the other hand, smaller companies might collaborate with the government to create policies that make compliance manageable, allowing them to compete in the genAI market. The government's collaboration with companies would also help maintain a balance between encouraging innovation and ensuring safe, ethical practices. Regulations would likely focus on data privacy, genAI ethics, and fair labor practices to ensure citizens' rights are prioritized. At the same time, apart from the aforementioned audits, the government could provide incentives to companies that meet compliance standards while innovating responsibly, thus easing companies' concerns about overly restrictive rules. The government might also support smaller companies with grants or other resources to promote healthy competition and market entry.

Inhibiting and preventing development of generative AI (heavy regulation, low acceptance)

The second scenario is situated in the top left corner of the scenario matrix, at the intersection of heavy regulation and low acceptance. Its name is 'inhibiting and preventing development of generative AI'. I will now explore this possible future.

Macro-environmental movements

Legal

Motivated by the dangers, controversies, and risks of genAI rather than its potential, governments would introduce more and stricter regulations to prevent misuse of the technology and protect the status quo [6]. Problems such as a lack of quality control, algorithmic bias, mis- and disinformation, and deepfake content exhibited by genAI algorithms would motivate governments to inhibit its usage as much as possible [43].

Strict regulations combined with a low public acceptance rate of genAI would not exactly be ideal for companies working with or producing genAI. With laws making it increasingly difficult to adopt this technology, companies

might start to push back against the government for forcing them to decrease or stop using it. At the same time, they might struggle with internal conflict caused by skepticism towards genAI by employees, leaving these companies divided [43].

Citizens would want protection against the nefarious applications and effects of genAI, and so would likely support heavy regulations [30]. Fears such as identity theft, having your voice or likeness stolen for the generation of a deepfake, or personal defamation are all reasons that individuals might not trust and accept genAI and encourage stricter laws [43][30]. Furthermore, citizens might object when companies use genAI algorithms for decision-making, causing lawsuits to become more common if these companies cannot provide an explanation for their output, or if an individual disagrees with the way they were categorized.

Economic

Having a strict regulatory landscape for genAI while other countries might not does not put the Netherlands in an advantageous position economically. Companies might prefer other countries to base themselves in as they do not have laws of the same severity [42]. Furthermore, the government's reluctance to adopt genAI technology might make the Netherlands more reliant on those in charge of technology and cause them to lose their ability to negotiate on an economic and political level [43][60].

Companies that are unable to optimize the use of genAI would lose market share and start to lag behind their more innovative competition, which might manage to implement genAI technology despite pushback from the government in the form of strict regulations [43].

Citizens might fear that genAI will affect their job and livelihood, and with good reason. Skills that were once highly valued might diminish in worth with economic and technological progression [61]. Even though individuals will be reluctant to accept genAI's influence, they will need to adapt and add to their skills in order to stay competitive in the labor market [62].

Social

The government would put protocols in place to ensure the potential nefarious applications and effects of genAI are mitigated as much as possible. These effects include but are not limited to scams, identity theft, deepfakes, disinformation, social manipulation, and privacy violations [43][30]. To combat this, governments might mandate safety procedures like authentication protocols, audience disclaimers, provenance, or digital watermarking out of fear of negative consequences [30].

Companies might help their employees adapt to the changing market by enhancing current skills and ensuring they receive proper and specialized

training to stay competitive and up-to-date regarding AI skills, even though the employees might not welcome this idea [62].

The perceived invasion of genAI in the lives of individuals might lead to a phenomenon called technostress, which occurs when technology has negative physiological and psychological effects on a person [63]. This phenomenon has five dimensions according to Ragu-Nathan et al. (2008): techno-overload (ICTs leading to increased workload), techno-invasion (ICTs intruding on a person's personal life), technocomplexity (ICTs are difficult to use), techno-insecurity (ICTs leading to job risk), and techno-uncertainty (ICTs are constantly evolving) [64]. This low acceptance of genAI would lead people to welcome better and stricter regulations and to root against AI and its effects.

Conclusion

In this scenario, the social aspect of the PESTLE analysis garners the most attention. This scenario focuses on combating and preventing the negative effects of genAI. Both the government and companies aim to protect themselves and citizens from potential harm by implementing strict regulations. Unlike the first scenario 'human-centered generative AI', the motivation here is driven by societal distrust and skepticism toward genAI. Regulations serve to limit its use rather than support its growth.

Promoting or eliminating the positive or negative implications of 'inhibiting and preventing development of generative AI'

Citizens would support the government's strict regulations to mitigate genAI risks and prevent further negative impacts. Civil society organizations and workers' unions could collectively pressure the government to keep their regulations around genAI up-to-date, ensuring citizens' rights are protected. Citizens might also participate in educational programs organized by the government and strengthen their ability to critically assess genAI technology. Given that citizens largely distrust the government due to past genAI missteps, the government would prioritize rebuilding trust by enforcing strict regulations on genAI. Public campaigns and educational programs on digital literacy, critical thinking, and genAI impact would be central to the government's efforts to inform and reassure the public. Regular public consultations or other ways of receiving feedback might be introduced, allowing citizens to voice their concerns and suggest further policy improvements. These steps could help citizens feel acknowledged and reduce technostress. Due to low genAI acceptance, many citizens would be resistant to interacting with or working for companies that heavily rely on genAI. Consumer advocacy groups might organize campaigns to encourage ethical genAI practices in business, urging companies to be transparent about their data handling and limit intrusive AI practices. Individuals might also gravitate toward

smaller companies or companies that demonstrate a commitment to ethical AI use. Companies would find it challenging to attract employees and customers who are skeptical about genAI. To address this, they might offer additional workplace incentives, such as higher salaries, reskilling programs, mental health support, or flexible working conditions, to mitigate technostress and job displacement concerns.

Companies would likely be frustrated by heavy restrictions and engage in lobbying efforts to decrease the amount of regulations. Larger companies might consider relocating to less restrictive regions or limiting their genAI development in the Netherlands. However, compliance would be necessary for companies wanting to stay competitive domestically. This could involve adopting policies that prioritize ethical genAI development, data privacy, and fair labor practices to better align with government requirements and public sentiment. The government would work to control genAI's influence on society, focusing on limiting potential harms and promoting responsible corporate behavior. This may include introducing strict data protection laws, workplace protections, and transparency requirements. However, due to the low public acceptance of genAI, the government would also need to manage companies' discontent over restrictive regulations. To prevent mass corporate departures, the government could offer tax incentives or grants to support genAI in fields aligned with public welfare, such as healthcare or education, while enforcing strict boundaries on its other uses.

Uninhibited development of generative AI (light regulation, high acceptance)

This next scenario is situated in the bottom right corner of the scenario matrix, at the intersection of light regulation and high acceptance. I have named it 'uninhibited development of generative AI'. Let us explore this scenario.

Macro-environmental movements

Legal

The government would be motivated by the positive implications of genAI and its high acceptance in society, and will therefore want to boost its development and usage as much as possible. This would be achieved by adopting a 'laissez-faire' approach regarding laws and regulations, leaving tech companies with more room to grow, experiment, and innovate [12].

A landscape where regulations are light and societal acceptance is high, would be like a playground for tech companies. However, it would also bring uncertainties, such as the aspects of responsibility and accountability [44]. GenAI models generate their output independent of human intervention,

which makes it hard to assign liability to its output. Who is accountable when the outputs lead to harmful, erroneous, or biased consequences? The developers of the model, its users, or maybe the model itself? Without clear regulation, questions like these will be difficult to answer, leading to potential legal disputes for organizations developing or distributing genAI products [43].

Citizens would notice that while there is high societal acceptance of genAI and thus support for new products and innovations, their rights would not be well protected. This could lead to legal ambiguities and disputes surrounding intellectual property rights, ownership, and privacy [65]. For instance, when there is uncertainty about whether some content was generated by AI or made by a person.

Economic

Economically, politically, and strategically, the Netherlands might gain influence as a nation that prioritizes technological advancement [43]. While this has positive effects, the government might become trapped in an international AI-race, where all dominating countries want to be the first to develop certain technologies [66]. Such a competitive landscape with differing regulations between countries can result in unfair tactics, such as infringement on intellectual property, data theft, or other unethical behavior [43]. These practices can affect the global economy and have geopolitical consequences. For companies, limited regulation might intuitively be associated with a free market and thus opportunities for all. However, when it comes to tech companies working with and developing genAI, it is far more likely that certain entities or companies will reign over the market and pull all influence and power toward themselves [43]. For smaller companies, this may mean less competition, less innovation, and restricted access to AI technology. Compared to bigger companies that can afford state-of-the-art AI technology, smaller firms or organizations might not have the resources or skills to create or implement AI models, putting them at a competitive disadvantage. This might widen the economic divide between various businesses and lead to a market dominated by Big Tech [12].

Citizens might not be able to afford AI products and services as companies can arbitrarily set their prices in an unregulated market [43]. This can result in a divide where some individuals can benefit from genAI technology whereas others cannot, leading to further economic inequality. Furthermore, the combination of light regulations and high societal acceptance of genAI might lead to the technology being used to automate tasks currently performed by humans [67]. This could lead to job displacement in multiple different sectors and without regulations put in place, the economic benefits of employing genAI might not reach every member of society [68].

Social

One of the risks of underregulated but widely accepted genAI is that the output these algorithms produce is highly prone to bias and discrimination since the vast amounts of data these algorithms require for training are filled with pre-existing biases [69]. These biases can relate to any sort of sensitive personal data, such as gender, sexuality, race, or religion [70]. For governments, who will likely want to utilize genAI as well, employing such algorithms thus carries significant risk for those affected. An infamous example of algorithmic bias is the childcare benefit scandal in the Netherlands, where around 26,000 benefit recipients were wrongfully accused of fraud by the Dutch Tax Authority's AI algorithm, leading to total financial and emotional devastation [71]. Disasters like these can have far-reaching societal effects and might become more frequent in this scenario.

Another risk can be found in the form of the environmental impact of genAI [1][46]. Large-scale genAI models require huge amounts of data for training and thus leave a major carbon footprint [1]. Without regulations, tech companies developing, training, or maintaining genAI models will continue negatively impacting the environment unless they actively choose to be more sustainable.

A risk for individuals could be that, with genAI being widely accepted and used but not necessarily regulated, people start to overly rely on the output of these algorithms, without verifying the information of critically evaluating the content [72]. Furthermore, if genAI is increasingly used to perform creative tasks, such as image generation, video making, or writing, this could have detrimental effects on human creativity [6]. In the long run, human contributions to these fields might be valued less, affecting the job market and the notion of creativity and creation [43][53].

Conclusion

For this scenario, where high enthusiasm for generative AI leads to a more relaxed regulatory approach, the economic aspect of the PESTLE analysis is the most influential, especially because the (global) AI market could look drastically different depending on how the parties act. Society encourages innovation and economic growth, thus allowing the genAI market to thrive with minimal restrictions. The goal is to foster technological advancement by maintaining light regulation to maximize its benefits.

Implications for the government

The driving force for this scenario is optimizing innovation. The Dutch government would likely consider it strategic to develop its domestic AI sectors. They would be hesitant to impose regulations on developers that could hinder innovation since they recognize that there may be significant benefits to

being the first to market with a technology [42]. Of course, EU-wide regulations would still need to be enforced, but no additional legislative measures would be taken.

Globally, the Netherlands might rise to be a bigger player economically, politically, and strategically because of its priority on technological advancement [43]. Currently, the US and China are the biggest countries when it comes to genAI development and they are already competing with each other in a sort of AI-race [66]. Specifically, it is private tech giants that are leading the race, such as Amazon, Apple, Alphabet, Meta, or Microsoft for the US, and Alibaba, Baidu, and Tencent for China [66]. As such a small country, it would not be easy for the Netherlands to compete with the levels of investment and power that these massive nations and their associated Big Tech companies have. It would almost certainly require a Dutch or European alternative company to rival the American and Chinese ones.

Because of this massive rivalry that the Netherlands would presumably be aiming to take part in, the prospects for a global governance framework are not great [43][66]. Norms and regulations would vary per country, which can lead to unfair tactics, such as infringement on intellectual property, data theft, or other unethical behavior [43]. Technological relations with these nations might become strained because of these tactics, possibly destabilizing overall relations as well, leading to major geopolitical changes.

Another implication of this scenario for the government would be the societal consequences of lightly regulated genAI. Even though there would be a high acceptance rate for the technology, the potential negative effects should not be understated. GenAI algorithms require huge amounts of data to be trained and tested, and if the data includes bias or discrimination, so does the output [69][70]. When governments decide to use genAI, as they likely will, this can have serious societal consequences.

First, like the example mentioned in the previous section, bias present in data can disproportionately affect certain minority groups, which can have major consequences when it's a government decision [1][73].

Second, confidential and sensitive government information could inadvertently be disclosed by genAI algorithms' output, which breaks many data protection protocols [73]. In this light, citizens' privacy must be a top priority [74].

Third, while in this scenario public trust and acceptance of genAI is high, maintaining this stance will prove difficult if hallucination compromises the quality and integrity of genAI outputs from government algorithms [75].

Fourth, if the government decides to focus on the usage of genAI in the public sector, they must make sure their cybersecurity is up to the task and can handle these points of vulnerability. [75][76].

Finally, in this scenario, the carbon footprint of genAI will be quite significant. As the government aims to make the Netherlands an attractive

country for companies developing genAI algorithms, this leads to increased energy consumption and thus a negative environmental impact [6][53][77].

Implications for companies

In this scenario, companies would be relatively free to innovate and create new products and services as they please and enjoy the general population's support in doing so. This would mean they could fully optimize the economic benefits that genAI can bring them [12]. Because the legal landscape would be quite lenient and permissive, responsibility and accountability become an area of interest when a genAI model produces output that leads to erroneous, harmful, or biased consequences [44]. In order to avoid potential lawsuits regarding this, companies would likely draw up legal documents detailing they are not at fault, similar to how in Dutch law, car owners and drivers are almost always held accountable in the case of an autonomous vehicle crash [78]. Tech companies may also draw up additional documents detailing that insurance cannot recover damages from, in this case, the car manufacturer to avoid liability completely.

Furthermore, while in theory all companies wishing to work with or develop genAI technologies could thrive in this scenario since there are very few barriers to market entry, there is also the possibility that big, established players in the international tech field will hold a lot of power [43]. Without regulatory intervention, small and upcoming companies would have difficulty competing with Big Tech because of the disparity in resources [57][58]. That is not to say it would be impossible for these companies to thrive, as with proper funding and support they could still claim their corner of the genAI market.

Implications for citizens

This scenario would allow citizens to utilize genAI technology to their heart's content, given that it is widely accepted and available for all. People would also be happy with lots of new products and innovations being brought onto the market for them to utilize, and they would find creative ways to use genAI to create new things or optimize their lives. Automation of certain tasks might free up some precious time for individuals, leaving them with more time to spend on other pursuits. Citizens could also influence what types of products companies bring to the market; after all, demand drives supply.

However, there are also downsides. Fast development and innovation of genAI products without sufficient regulation could diminish the protection of civilians' rights, such as their personal data, privacy, or right to non-discrimination because of persisting biases and stereotypes in the data used to train the genAI [3][52]. Some citizens might not be aware or be unboth-

ered by this and continue to use the products, while others might find this trade-off too unfavorable and choose to stop using genAI. Using genAI for many daily tasks also risks individuals growing overly reliant on an algorithm's output [53]. People might overestimate or overtrust genAI and fail to fact-check or verify the output for validity and biases, which would contribute to the spread of misinformation and potential stereotypes. Similarly, if genAI is used as a creative medium, such as for writing, video making, or image generation, this could have detrimental effects on human creativity and even lead to these skills not being 'needed' anymore and thus forgotten [6][43][53].

Furthermore, even though there might be a high demand for genAI-powered products, the relatively unregulated market might mean that not everyone can afford these products, thereby leading to further societal divides and economic inequalities since companies can set prices arbitrarily high [43]. The lack of regulation might also contribute to more job displacement since some jobs currently performed by humans might be automated in order for employers to save money [67]. These two aspects combined would mean that lots of genAI innovation and acceptance, but without regulation to oversee it, could bring economic fortune to some citizens while taking it away from others, thereby worsening existing economic differences in society [68].

Implications on the relationships between government, companies, and citizens

In a scenario with light regulation and high acceptance, there would likely be a divide in how different groups of citizens feel about the situation. While some might appreciate the innovation and the benefits of rapid technological progress, most citizens and civil society would likely demand stricter regulations due to the negative impact on their rights and privacy. Light regulation could lead to biased data being used in government decision-making, which would disproportionately affect minority groups. This, along with the government potentially using genAI algorithms for key decisions, could damage the trust between the government and its citizens. Additionally, citizens' privacy would be at risk, further eroding their confidence in the government.

On the other hand, many citizens might initially be pleased with companies' introduction of innovative products that make their lives easier. However, concerns about how companies handle consumer data and the quality of data they use may grow over time. As companies continue to abuse consumers' trust by releasing unethical products or misusing personal data, public goodwill could eventually run out, leading to widespread mistrust in these corporations.

Companies would likely welcome the high demand for new products and en-

joy the public's initial acceptance, even if the products aren't fully ethical. At the same time, automation powered by genAI would lead to significant job displacement as companies prioritize profit, leaving workers vulnerable with little to no regulations in place to protect their jobs. Furthermore, if the government doesn't regulate the genAI market, companies would be free to set their prices as high as they wish, causing citizens financial distress. This lack of regulation would likely result in a further decline in trust between the public, the government, and corporations.

However, both the government and large tech companies share a mutual goal: optimizing innovation for economic benefit. Big tech companies, with their resources and influence, would likely collaborate with the government to create a favorable environment for genAI development. While this collaboration could boost the Netherlands' international position economically and strategically, smaller companies may struggle to compete. Without sufficient resources, these smaller firms might lobby the government for more legislation to level the playing field. The government could find itself caught between fully embracing big tech's potential and feeling pressure from civil society and smaller companies to address domestic concerns. Regardless of the government's direction, it's quite possible that the relationship between the government and large corporations would be close.

Promoting or eliminating the positive or negative implications of 'uninhibited development of generative AI'

Citizens and civil society groups who are concerned about genAI violating their rights could advocate for privacy protections and anti-discrimination safeguards, using public opinion to demand changes. If citizens' concerns about data privacy and job displacement increase, they may organize grassroots campaigns or protests to pressure the government into implementing more protections. To address the growing distrust among citizens, the government could create public forums or town hall-style meetings to discuss genAI's implications. Additionally, the government could introduce initiatives to ensure transparency about genAI, such as informing citizens about how their data is used in genAI decision-making. These regular meetings could give citizens a sense of agency, reassuring them that their concerns are heard and encouraging them to embrace innovation rather than reject it.

As public awareness around data privacy and ethical genAI grows, citizens could demand companies adopt 'voluntary' ethics codes by advocating for transparency or boycotting companies that do not comply. Citizen initiatives such as petitions or collaborations with consumer rights groups might encourage companies to develop fairer genAI products or address the needs of marginalized communities. As a result, companies might commit to ethical genAI standards to keep citizens engaged and address their privacy concerns. Companies could help maintain citizen trust through educational

campaigns showcasing the benefits of genAI products, especially for improving quality of life. Smaller companies might align with civil society groups and the public to advocate for regulations that promote fair competition, creating a balance between innovation and ethical considerations. Companies might also collaborate with educational institutions to help employees displaced by automation and educate them in a different field.

Companies, especially large tech companies motivated by profit, would work closely with the government to maintain a favorable regulatory environment. They could propose self-regulation measures to address public concerns about privacy, ethics, and job displacement. This could look like certification programs or industry codes of conduct. However, large corporations might lobby against stricter regulations, emphasizing innovation's potential economic benefits to influence government opinion. Focused on and motivated by this potential economic growth, the government could form close alliances with these large tech companies to establish the Netherlands as a leader in genAI innovation. By providing incentives, grants, or favorable policies, the government would help companies thrive in this environment. However, given citizens' privacy concerns and the risk of biased algorithms, the government might also consider setting baseline standards for ethical AI use, aiming to at least prevent extreme cases of misuse without imposing heavy regulations.

Indifference towards generative AI (light regulation, low acceptance)

This final scenario sits in the bottom left corner of the scenario matrix, at the intersection of light regulation and low acceptance. This one is called 'indifference towards generative AI'. I will now answer the questions I made based on the STAP model for this scenario.

Macro-environmental movements

Legal

In this scenario, the government would likely not be focused on creating specific laws that deal with genAI, choosing instead to handle genAI-related issues through general data or privacy laws, such as the GDPR, AI Act, and other software liability directives [18][14][13]. The motivation to do this would not be to promote innovation, but rather because there is widespread skepticism towards genAI, making it not a priority in society.

Companies, especially smaller ones, would likely not find this type of environment conducive to their business potential [79]. The field would not be very competitive without a clear framework, regulations, or societal support and acceptance for genAI. This leaves companies in a position where the

lack of rules indicates not a go-ahead but rather signals them to stay away and try elsewhere.

In a society where the government continually desists from taking action when it comes to citizens' concerns toward genAI, some unrest might spark among them, especially when globally 77% of people in present-day already agree that AI needs to be heavily regulated [47]. Assuming that this number will only go up as acceptance of genAI decreases, the public would perceive regulations in this scenario to be lackluster.

Economic

Without the government implementing genAI regulations, the Netherlands would likely lose its position in the international technology market [43]. Ignoring the surge of genAI-powered tools and algorithms that other countries are using would thus prevent the Netherlands from benefiting from genAI-driven productivity and efficiency gains. [80].

There would be hardly any companies investing in genAI products since there is little to no demand from consumers. Companies that have the choice to do so will likely focus on other products and business practices that are not genAI-related, meaning they lose out on the potential benefits while keeping their employees and customers satisfied.

For citizens in this scenario, genAI would not transform the labor market as much as it potentially could, either by replacing jobs or creating new job opportunities, which would prevent the negative consequences that most people fear [53][43][80].

Social

Distrustful and skeptical of genAI, the government would want the technology to disrupt society as little as possible. I already highlighted the potential negative economic effects, however, for society as a whole, there might be positive effects too. Limited usage and training of genAI algorithms means the environmental impact is limited severely [80][6][46].

Companies might focus on giving their employees more skill-based training rather than technological training, leading to further personal development for their staff [43].

In this scenario, the general public holds a cautious or distrustful view of genAI. They would be very aware of the risks associated with AI, such as job displacement, loss of privacy, and ethical concerns, rather than the potential benefits [43][30]. This skepticism could be fueled by past negative experiences with the technology, media portrayals, or a broader preference for human-centered approaches. Furthermore, this scenario could be one where, because of insufficient guardrails in the past, society has become a sort of parallel reality because of the AI autophagy phenomenon [81]. This

is where generative AI systems increasingly use their own outputs as input. This can lead to a reality where the original data on the web is gradually replaced by synthetic and contaminated data, severely limiting information reliability and raising ethical concerns. Citizens might lean towards shaping a society that is less impacted by (gen)AI technology, focusing less on digital technologies and more on human skills and connections. Potentially, polarization will arise between generations where older people are more skeptical than younger generations, or between rural and urban areas [43].

Conclusion

For this scenario, the social aspect of the PESTLE analysis is probably where the biggest changes compared to the current attitude towards genAI take place, especially concerning the shift away from AI technology towards more human connections. The question becomes: do we want genAI to play a role in our daily lives, or do we wish to decenter (AI) technology from society? This speculative scenario envisions a future where AI plays a diminished role, contrasting with current national and even global trends.

Implications on the relationships between government, companies, and citizens

In this scenario, the government's attitude towards genAI would be passive, largely due to the general low acceptance of the technology among the population. As a result, they would not deem it necessary to introduce new legislation. However, this approach could lead to significant disagreement among citizens and civil society who may push for stricter regulations, fearing the negative influence of genAI. The government's complacency might lead to unrest and potential protests as citizens feel their concerns are being ignored. Trust in the government would gradually lessen, leaving citizens with a sense of abandonment. They might increasingly turn away from relying on governmental support and focus instead on building communities centered around human skills, personal connections, and a lifestyle independent of technology such as genAI.

Given the little demand for genAI products, companies would not feel compelled to innovate, develop, and invest in them. Instead, they would focus on other products and services that would cater to consumer interests and strengthen their relationship with the public. Companies that insist on working with genAI, even though it is not particularly supported in the Netherlands, would face societal backlash and be viewed negatively. They might choose to relocate to places where genAI has more public support and market potential. In terms of employment security, citizens would be relatively secure in their place of work since genAI plays little to no role in most organizations. Companies might encourage personal development and

soft skills over technical expertise, leading to a relatively stable and neutral relationship between employers and employees.

The market might also see an absence of large tech corporations, which will have moved on to more lucrative markets with a greater demand for their products. This would leave smaller companies to figure out the landscape where there is very little economic progress and possibly even stagnation or regression, as the lack of genAI usage would have detrimental effects on the economy. The government might feel unable or unwilling to change this situation, possibly influenced by previous negative experiences with genAI or envisioning a society less reliant and focused on technology. In this environment, companies would struggle to remain competitive and may consider relocating or shifting their business in a different direction to stay afloat.

Promoting or eliminating the positive or negative implications of 'indifference towards generative AI'

Here, in order to eliminate the potential distrust between citizens and the government, local governments such as municipalities might organize meetings where citizens or representatives can make their voices heard regarding their worries about genAI. This would help mitigate citizens' concerns about the government being complacent regarding genAI implications, and help bring back some trust between these parties. Governments would then have to put this input into practice to maintain trustworthy to the public.

Local communities might also organize meetings among themselves, focusing on connections within their neighborhoods. For example, they might encourage creative activities such as painting, pottery, making your own clothing, and other artistic pursuits in an effort to 'escape' from a technology-centered lifestyle, connect with the people around you, and focus on skills that are difficult to replace with genAI.

Companies that have shifted their market strategy from tech-focused to consumer-focused, possibly by conducting surveys on what citizens want in this changing society, would build stronger relationships with the public. These types of companies that are willing to shift their business strategy to one that is more fitting in this type of future would also be the ones that people are happy to work for, leading to increased employee satisfaction. Understandably, changing a company's entire business focus from tech-centered to human-centered is not an easy shift and could lead to financial problems. To aid in this, the government could financially incentivize companies to stay in the Netherlands in order to keep the domestic economy alive and prevent mass layoffs through relocation. This way, all parties benefit, since companies that are motivated to adapt to consumers' wants keep their place in the market and help boost the economy in their own way, benefiting everybody.

Discussion

Future work

My work has focused on creating an overview of possible avenues to take to ensure we enter a positive genAI future. I have also suggested ways to achieve this, however, I have not yet suggested concrete ways to implement these changes. Future research should focus on designing a plan of action for the creation, appointment, and introduction of, for example, independent third parties responsible for conducting tests and audits to ensure genAI output is not biased or discriminatory. This research should also suggest under what conditions these audits would be conducted, for example when an algorithm is classified as high-risk under the AI Act, or when there is reason to believe an algorithm is producing biased output. The study should identify possible members of this committee, such as policymakers or experts in the field of genAI.

Another avenue of research should look into the stimulation of genAI literacy, which I have defined in this study as a prerequisite of genAI acceptance and an important factor in reducing technostress [31][63]. While frameworks regarding genAI literacy exist, it is important to assess who should provide these educational courses for which target audience and how to reach as many citizens as possible [82].

Furthermore, it is important to study how to increase citizen participation and implement sound feedback loops between the three parties. This would increase trust between parties, especially between the government and citizens, and between companies and citizens, contributing to a higher genAI acceptance in society.

Finally, future research should explore how the Dutch government can collaborate with the European Union to update laws and regulations regarding genAI. Specifically, ways to make the lawmaking process more dynamic and flexible should be explored. This way, new developments regarding genAI could be regulated and safeguarded earlier and more efficiently, making the products safer for everybody.

Reflection and limitations

I have written this thesis over the course of the last nine months and I would like to share some reflections. Defining the scope of the project was quite challenging. On the one hand, I knew I wanted to research genAI but not one specific domain, and on the other hand, by not choosing a specific domain I would risk my scope being too broad and therefore too ambitious, or not detailed enough. I ended up narrowing my scope to focus on the relationships between governments, companies, and citizens in order to incorporate the societal aspect of genAI as much as possible. This also meant that I could only look at the Netherlands as my scope since governmental policies differ per country. This is a limitation in my study; genAI is a technology that has a global impact and its societal implications extend far beyond the Netherlands. In fact, many societal implications of genAI disproportionately affect the global south, and being unable to take this into consideration for my study is unfortunate [53].

Furthermore, I conducted this research at an external organization, The Netherlands Study Centre for Technology Trends (Stichting Toekomstbeeld der Techniek or STT in Dutch). This organization specializes in futures studies, which is why I also chose to incorporate the futures studies aspect in my thesis. This area of science has not been part of my education and thus was completely new to me, and I thoroughly enjoyed exploring it. At the same time, the fact that I had no experience with futures studies meant that I was not as well versed in its theoretical background as I would have liked. Had I had more time, I would have compared different forms of futures studies with my chosen method of scenario planning, to see if another method might have been better suited to my particular research.

Additionally, I tested my ideas and results of this study during one workshop and one presentation. Experts in AI attended the workshop, while I gave the presentation to experts in explorative future scenarios. The participants and attendees asked thought-provoking questions and helped me further explore my scenarios and consider possible avenues I had not thought of yet. I gathered this feedback qualitatively and in the final phase of my research. If I had done this at an earlier stage, I might have had the opportunity to speak to more experts to test my thought process.

Conclusion

The goal of this thesis was to find out how to achieve the best possible future regarding generative artificial intelligence, with a focus on the future societal relationships between the government, companies, and citizens. The best future is one where genAI's opportunities are optimized, while its vulnerabilities are minimized. In order to do this, I explored four different future scenarios, each with a different combination of levels of genAI acceptance and regulation. This method allowed me to map the varying interests of the three parties since each party feels more comfortable with certain scenarios than others. Taking all these interests and elements from the scenarios together, I will now formulate how my research brings us closer to the goal of my thesis; to achieve the best possible future regarding generative AI.

Achieving the best possible future regarding genAI requires a collaborative approach between government, citizens, and companies. It must be based on trust and shared ethical values. The government must establish and update regulations prioritizing public welfare and protecting citizens' rights. Advice from ethicists, civil society organizations, and technologists would help to ensure these regulations properly represent societal values. Implementing a more dynamic and responsive lawmaking process is crucial to prevent laws from becoming outdated since genAI developments happen quicker than regulations are usually made. An independent third party must be introduced to approve, monitor, and audit (new) genAI algorithms and make sure they adhere to set ethical standards. This new regulatory body must do this for both governments and companies and must also be equipped to hand out fines or undertake legal action against those who do not comply.

The government must aim for citizens' trust and support by educating them through public campaigns and genAI literacy programs, which would teach them about genAI's risks and benefits so they are more informed and knowledgeable about the technology. In the case of stricter genAI regulation, they must also explain why this is necessary and how this will improve citizens' daily lives since some people might be frustrated with heavier regulation. Citizen feedback channels, such as public forums or locally organized meetings, would serve as a way for the public to indirectly participate in the lawmaking process by voicing their concerns regarding the genAI ecosystem

and demanding ethical standards. Additionally, these local meetings could serve as a way of fostering connections within neighborhoods and a greater sense of community and kinship in a world where we grow more reliant on technology and digital spaces rather than physical ones.

Companies need to demonstrate a commitment to ethical genAI practices and prioritize transparency, justice and fairness, non-maleficence, responsibility, privacy, respect for human autonomy, prevention of harm, and explainability. By adopting ethical codes, creating workplace support systems, and offering affordable and accessible genAI products, companies can earn public trust and enhance their societal value. Companies must also play their part in educating employees with genAI training programs to support responsible genAI adoption. Furthermore, companies that align their operations with public interests, such as using genAI to promote quality of life rather than to replace workers, will be more likely to succeed in the future economy by earning public approval. The government could offer financial incentives to support ethical and responsible innovation, especially for smaller companies. This promotes healthy competition and prevents monopolistic Big Tech dominance in the genAI market.

Our future should be built on open dialogue and mutual trust to ensure that genAI positively contributes to society without compromising human dignity. We must also not forget that human connections are vital and that genAI should be used responsibly in order to avoid a lifestyle that is completely technology-centered.

The future starts today and we decide what role generative AI plays in our society. My study has shown how we must work together to take it in the right direction.

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