# Management Summary

Like many other digital innovations, immersive technologies (virtual reality, augmented reality) offer great opportunities for our society. Immersive technologies can bring people together in new ways, play a role in treating diseases and pain, supplement reality with useful information, and provide new forms of entertainment. At the same time, the development and use of immersive technologies brings new risks. This raises the question of how we should regulate the development and use of immersive technologies to eliminate or mitigate these risks. The problem statement for this study is therefore:

> *Should the expected breakthrough of immersive technology lead to adjustment of the existing legal framework in the Netherlands and if so, how?*

Immersive technologies

Immersive technologies are technologies that modify our perception of reality by offering alternative sensory information. This allows reality to be adapted, expanded, or completely replaced by a virtual reality. Immersive technologies immerse users in this alternate reality, creating a sense of presence: the idea that the virtual reality is 'real'.

Immersive technologies come in different forms. The most well-known are *augmented reality* (AR) and *virtual reality* (VR). Where our perception of the physical world is expanded or modified, we speak of augmented reality (AR), and when the entire reality has been replaced by an artificial reality, we speak of virtual reality (VR).
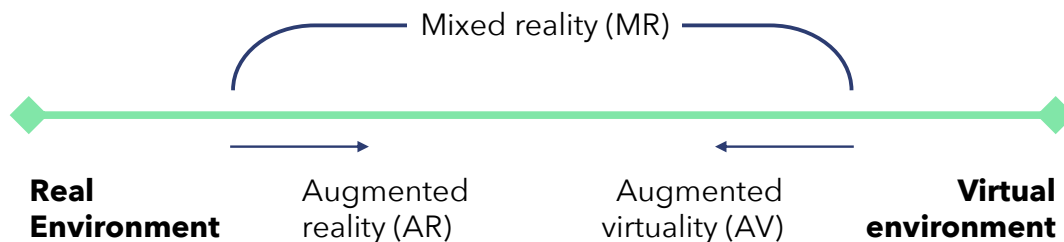
The most notable applications of immersive technologies are in the fields of entertainment and social interaction. Immersion increases the impact of the (game) experience and therefore we see that large players such as Playstation, Valve and Facebook are working on VR games and social platforms. Immersive technologies are also being used for more serious purposes, such as treating pain and mental disorders, training people, and supporting first responders. Furthermore, immersive technologies enable us to put ourselves in someone else's shoes and experience the world from that other person's perspective. Immersive technologies can thus contribute to the creation of empathy and mutual understanding.

Harmful and unwanted effects of immersive technologies

However, it is also to be expected that a broad adoption of immersive technologies will have undesirable effects and raise societal questions and issues. Based on our research, we arrive at the following categorization of possible issues / risks that a broad adoption of immersive technologies may entail:

1) harmful and illegal behavior in virtual worlds;
2) harmful consequences of using immersive technologies in the physical world;
3) harmful effects motivated by use/misuse of immersive technologies;
4) societal issues; and
5) misuse of immersive technologies by third parties.

Harmful and illegal behavior in virtual worlds is especially prevalent in virtual reality. Immersive technologies allow us to 'embody' ourselves in a different way. We are no longer bound to our physical body, but we can also put ourselves in a virtual body. This leads to new issues with regard to the legal status of the virtual body and violations thereof, for example in the form of a virtual assault. In addition to the damage to the virtual body, expression offenses such as insults, threats, and the distribution of illegal content (e.g. virtual child pornography) are potential issues in virtual worlds. For augmented reality, the phenomenon of virtual vandalism could lead to damage in the future. A specific issue in the overlap between the 'real' and the 'virtual' is the modeling of an avatar after the appearance of a real person. This makes it possible, for example, to have virtual sex with a colleague or famous person without their permission, or worse, with a virtual representation of a real child.

Issues concerning the *harmful effects of the use of immersive technologies in the physical world* are mainly related to augmented reality. This concerns users who are distracted by their immersive technologies, or who misinterpret the augmented reality. For example, road safety may be compromised by the widespread adoption of immersive technologies.

The question of the *harmful effects of the use / misuse of immersive technologies* is motivated by the assumption that immersive experiences influence our behavior and possibly our morality. For example, does someone become more aggressive as a result of a violent immersive experience, or does someone engage in transgressive sexual behavior after having extreme virtual sex? The negative effects of immersive experiences on user behavior are one of the main societal concerns and a direct reason for writing this report. In addition, prolonged and intensive use can also have other harmful effects in the longer term, such as addiction, detachment and alienation.

The use of immersive technologies will also lead to new *societal issues*. Augmented reality, for example, raises questions about social interaction and privacy. Immersive technologies contain all kinds of sensors (camera's, microphones, et cetera) with which the user can violate the privacy of others. Furthermore, the image of the other person can be supplemented or adjusted. As a result, the user of the immersive technology sees the other in a certain light (by using a nudity filter, by showing a reliability score above the head, et cetera). However, the other party does not know how he or she is perceived and what additions or adjustments are made. This can undermine mutual trust. Perhaps the most fundamental issue for the future is how we deal with the disappearance of a shared frame of

reference. People may look at the same object in the future and literally see different things because they experience a different augmented reality. The effects of such a loss of veracity are still difficult to foresee.

Finally, immersive technologies also provide scope for *abuse by third parties*. This includes on the one hand providers of immersive technologies that use the immersive technologies or the data they generate in an undesired manner, and on the other hand malicious third parties who, for example, use the immersive technologies or the data to manipulate of defraud users. Because the perception of a person can be directly influenced by means of immersive technologies and the effects thereof can be measured, the possibilities for influence, manipulation and fraud are significant.

The influence of immersive technologies on our behavior

With regard to the harmful effects that can arise from the use / misuse of immersive technologies and the issues that arise at the societal level, it is important to underline that it is unclear whether these issues will arise, and if so, what role these issues will play in the future. There is not yet widespread adoption and (almost) no research has been done into the long-term effects of prolonged or intensive use of immersive technologies. This makes it difficult to make strong statements about the effects of immersive technologies and experiences. Our conclusions regarding these two categories will therefore be tentative. Much more research is needed to understand the short- and long-term effects of immersive experiences and to guide the development.

What the existing research into immersive technologies does seem to show is that immersive experiences can have a greater effect on our perception and therefore on our behavior than 'traditional' media such as books and films. Research into the relationship between behavioral change and the use of immersive technologies shows that immersive experiences lead to conscious and unconscious behavioral changes among users, more than with traditional media. Moreover, anecdotal evidence of the effect of immersive technologies on people's moods (for example, the experience of a virtual assault or an intense firefight) suggests that immersive technologies do have an influence on our psyche and our behavior. Finally, successes in the medical application of virtual reality, for instance in the treatment of anxiety disorders or pain relief, show that the effect of immersive technologies is greater than that of traditional media.

Just as we are shaped by real life experiences, it seems that we can also be shaped by virtual, immersive experiences (for better and for worse). The difference between traditional media and immersive experiences is that the way in which our senses and therefore our brain is addressed is so convincing (because it is comparable to the way we perceive the real world), that our brain is much more willing to accept the experiences as 'real'. However, this does not mean that immersive experiences by default lead to behavioral changes. Rather, immersive experiences seem to be a catalyst for behavioral change. Not every experience of 'positive' content leads to a positive behavioral change and not every experience of 'harmful' content has a negative effect on the psyche or behavior of the user. As is also shown by research into the influence of media on behavior, the context of a certain (media) experience has an influence on the user's perception of this experience. The focus and 'normative load' of the immersive experience probably also contributes to the chance of a behavioral

change. Finally, the personal situation of the user plays a major role: does the user have certain physical or psychological predispositions, or are there environmental factors that influence the user's behavior?

Values at stake

The identified issues and risks have repercussions on values and interests in our society. Values such as truthfulness and trust are primarily at stake in immersive technologies. Can you still trust what you see and is the image that someone has of you not strongly mediated by immersive technologies? Immersive technologies can also be used to influence and even manipulate people, thereby jeopardizing personal autonomy. The misuse of images and data of individuals raises questions regarding privacy, physical integrity and human dignity. Lastly, there are issues surrounding property, safety and health.

Is the legal framework adequate?

The main question of this study is whether our legal framework if sufficiently equipped to protect these values and to effectively address the risks associated with the broad adoption of immersive technologies. The overall picture that emerges from the analysis of the applicability and completeness of the legal framework is that the current legal framework is reasonably well equipped to address any negative effects of immersive technologies. Particularly civil law has enough flexibility to remedy any wrongdoing and damage resulting from the use of misuse of immersive technologies.

When the objective is to prevent the unwanted and harmful effects of immersive technologies, we see that the current legal framework has more limitations. These limitations are mainly situated in the following areas:

1) Criminalization of undesirable behavior in virtual worlds (virtual rape, virtual vandalism, et cetera);
2) abuse of images of people;
3) distraction an endangerment through the use of immersive technologies;
4) the effects of immersive technologies on people and behavior;
5) the societal changes that immersive technologies can bring about.

Ad 1)
Unwanted and transgressive behavior in virtual worlds such as virtual assault, abuse and rape are currently not criminalized. Furthermore, virtual vandalism is not criminally sanctioned.

Ad 2)
Civil law and data protection law regulate the misuse of images of persons. However, misusing images of real people in virtual environments is not a criminal offence. There is also no clear criminalization for misuse of images in the context of AR, such as projecting nude images on clothed people using

AR. Finally, impersonation is not criminalized in and of itself. Additional conditions are necessary for this, such as the intent to defraud a person.

Ad 3)
Criminal law can only partially address distraction by immersive technologies and the resulting hazardous behavior. Article 5 of the Road Traffic Act offers possibilities to act when someone exhibits dangerous behavior, but the smartphone ban in traffic cannot be applied to immersive technologies such as AR glasses.

Ad 4)
There are few restrictions on providing harmful or offensive content to adults. When immersive experiences turn out to have a negative effect on our moral, physical or psychological development, additional regulation makes sense. However, as described above, the long-term effect of (prolonged and/or intensive) exposure to offensive immersive experiences are currently uncertain.

Ad 5)
Moreover, it is still largely unclear how people will relate to immersive technologies, how the technology mediates their behavior and worldview and what that means for human interactions. While it is likely that the current legal framework will show shortcomings, especially when it comes to protecting values such as truthfulness and trust, it is still too early to indicate in detail what these will be. It is also questionable whether the law can provide a solution to these issues.

Adjustment of legislation and regulations

The gaps in legislation and regulation can be addressed by making adjustments to the legal framework. Some adjustments can already be made now, for others it makes more sense to wait until we have a better understanding of the issues and possible solutions.

Unwanted and harmful behavior in virtual worlds directed against avatars (such as virtual assault) can be regulated through criminal law. We can opt for specific criminalization in addition to the existing offenses such as assault and rape, or for a reconceptualization of 'bodily integrity', so that attacks on the virtual body are brought within the existing descriptions of the crime. This last variant only seems relevant if in the further future when users fully identify themselves with their virtual body. For the time being, a separate criminalization with a lower penalty seems more realistic.

Using nude filters or having virtual sex with an avatar resembling a real person not only violates human dignity, but can also instill fear in the victim. Although the misuse of images of persons is (partly) regulated through civil and data protection law, a criminal prohibition also seems desirable in view of the impact on the victim.

In view of the undermining effect that impersonation can have on trust in society (such as mutual contact, but also the spread of fake news), an independent criminalization can also be considered (without, for example, the condition that there must be the intent to defraud).

To prevent the harmful effects of the use of immersive technologies in the physical world (distraction, endangerment, mistakes), legal requirements can be set for the use of immersive technologies and their development. With regards to the use, an extension of the smartphone ban in traffic seems logical, so that the use of immersive technologies such as AR glasses in traffic is also punishable. In addition, product liability and product safety regulations can set requirements for the development of immersive technologies that ensure that people are not distracted or are less likely to be distracted.

At this moment it seems too early for legal interventions that regulate the effects immersive technologies may have on people and their behavior, because it is not yet clear whether there is an effect and, if so, what the consequences are. If it appears that immersive experiences have a blurring effect on the comprehension of norms and lower the threshold for users to exhibit illegal or otherwise undesirable behavior, stricter regulation is appropriate. This mainly concerns prohibitions on offering and experiencing offensive immersive experiences and/or setting rules with regard to the responsible consumption of immersive experiences.

It also seems too early to come up with additional legislation and regulations for the social changes that a broad adoption of immersive technologies may entail. It seems wiser to guide the ethical development and application of immersive technologies as much as possible and only further regulate when the need for this becomes more clear.

Other options for regulation

In addition to legislation and regulations, there are also other instruments that the legislator can use to achieve a responsible adoption of immersive technologies.

The providers and experiences of immersive technologies play a central role in the careful and ethical development of these technologies. Not only does the design of the technologies and services determine the possibilities for use (and misuse), the providers can also enforce laws and regulations through their technologies and platforms. Given the limitations that apply to the enforcement of laws and regulations, it seems essential that providers and platforms have an active role in the regulation of undesirable behavior and the enforcement of prohibitions. For example, through co-regulation and self-regulation best practices and standards can be developed to address risks. Providers also play an important role in informing users and in creating awareness about the opportunities and risks of immersive technologies (warning systems, age rating). Finally, they can enforce rules through their terms of use and community guidelines.

Technology also plays an important role in regulating user behavior. By setting requirements for the design of the technology, the risks of immersive technologies can be limited. This includes making certain behaviors impossible in virtual worlds, imposing requirements on user interfaces, offering opt-in / opt-out options for (non-)users, limiting realism in certain contexts and regulating user generated content (mods).

Importance of research and guidance

In the opinion of the researchers, immersive technologies will have a major impact on people and society, in particular when it turns out that intensive or long-term use of immersive technologies leads to behavioral changes and values such as truthfulness and trust are compromised.

It is therefore of great importance to closely monitor the effects of immersive technologies on people and society and to facilitate an active social and ethical dialogue about the development and use of immersive technologies. A concrete implementation of this way of thinking, guidance ethics, is also specifically mentioned in the government response to the Rathenau Instituut report *Verantwoord Virtueel,* as a possible avenue to explore alongside regulation. In addition to a social dialogue, extensive scientific research into the long-term effects of immersive technologies is needed.

A better understanding of the effects of immersive technologies is not only necessary to formulate effective legislation, but also to ensure that we do not introduce laws and regulations that hinder the development of all beneficial hand harmless applications of immersive technologies.

Overview of the main conclusions
Based on the above, we can summarize the results of this research in the following tables:

1. Harmful and illegal behavior in virtual worlds			
Risk / issue	**Possible gaps in legislation and regulation**	**Regulating options**	**Remarks**
Expression offensens (insult, threat, harassment)	-	-	• Existing crime descriptions also apply in the context of virtual worlds. • Possibilities to claim damages through civil law.
Virtual theft	-	-	• No explicit criminalization, but since the Runescape judgment virtual goods fall within the criminal law definition of a good.
Virtual violent and sexual crimes	• Absence of crimininalization of virtual assault, rape and abuse.	**Legal:** • Criminalization of virtual assault / rape as sexual harassment. • Criminalization by reconceptualizing physical integrity. **Technical:** • Limiting technical possibilities (creating distance between avatars, not being able to perform violent or sexual acts). **Organizational:** • Awareness and information	
Virtual vandalism	• Lack of criminalization of virtual vandalism	**Legal:** • Change crime description of vandalism	

		Technical: • opt in / opt out register for AR applications Organizational: • Enforcement by providers • Information and awareness	

2. Harmful consequences of using immersive technologies in the physical world

Risk / issue	Possible gaps in legislation and regulation	Regulating options	Remarks
Distraction and endangerment	• Limited ability to proactively deal with distraction and endangering behavior.	**Legal:** • Criminalization of the use of immersive technologies in traffic (expansion of smartphone ban). **Technical:** • Requirements for design interfaces to avoid distractions, warnings. **Organizational:** • Information and awareness	• The current legal framework (Article 5 of the Road Traffic Act, civil law) offers possibilities to act against distraction and endangerment, but the danger must already have occurred (Road Traffic Act) or suffered (civil law).
Mistakes in interpretation physical world	-	**Organizational:** • Information and awareness	• No direct gaps, because it is possible to link up with (culpable offence) variants of existing crime descriptions and civil law. When prevention is the goal, information and awareness seem to be the most relevant instruments.
Disruption of the physical world	-	**Organizational:** • Information and awareness	• No direct gaps, because it is possible to link up with (culpable offence) variants of existing crime descriptions and civil law. When prevention is the goal, information and awareness seem to be the most relevant instruments.

3. Harmful effects motivated by experience/use of immersive technologies

Risk / issue	Possible gaps in legislation and regulation	Regulation options	Remarks
Blurring of norms and transgressive behavior (aggression, hypersexualization,	• Lack of criminalization of offensive / harmful content. • Lack of criminalization of using images of real	**Legal:** • Expand the criminalization of offensive / harmful content. • Criminalization of using images of real people for virtual sexual acts.	• When it appears that immersive experiences lead to transgressive behavior, strict regulation of objectionable content is necessary. For the time

sadism, radicalization)	persons for virtual sexual acts.	**Technical:** • Limitations to realism/immersion • Mandatory warnings **Organizational:** • Information and awareness • Research	being, there seems to be no reason to do so and further investigation is required. For now, information and awareness seem to be the most appropriate instruments. • Transgressive sexual behavior such as the use of AR nude filters and the use of images of real persons for sexual acts is currently not punishable by law.
Addiction	• Lack of specific rules when immersive experiences turn out to be (highly) addictive.	**Legal:** • Prohibitions of specific content • Regulating access to content **Organizational:** • Information and awareness • Research	• When immersive experiences turn out to be (highly) addictive, measures can be taken comparable to those that apply to stimulants and other addictive substances/activities. For the time being, there seems to be no reason to do so and further investigation is required. For now, information and awareness seem to be the most appropriate instruments.
Detachment and alienation	• Lack of regulation preventing detachment and alienation when immersive experiences appear to have this effect.	**Legal:** • Prohibitions of specific content • Regulating access to content **Organizational:** • Information and awareness • Research	• When immersive experiences lead to detachment and alienation, and causes physical, psychological or social damage, stricter regulation can be considered. For the time being, there seems to be no reason to do so and further investigation is required. For now, information and awareness seem to be the most appropriate instruments.
Shocking experiences	• Lack of criminalization of exposure to shocking experiences.	**Legal:** • Criminalization of intentional exposure to harmful content (psychological abuse). **Organizational:** • Information and awareness • Research	Exposing an adult to a shocking experience is currently not a criminal offence. If it appears that such exposures lead to (psychological) damage, a ban is logical. For the time being, there seems to be no reason to do so

			and further investigation is required.
Effects on our memory	• Lack of regulation aimed at preventing negative effects on our memory.	**Legal:** • Prohibitions of specific content • Regulating access to content **Organizational:** • Information and awareness • Research	If it appears that immersive experiences have a negative effect on our memory and lead to (psychological) damage, regulation is logical. For the time being, there seems to be no reason to do so and further investigation is required.

4. Societal issues			
Risk / issue	**Possible gaps in legislation and regulation**	**Regulation options**	**Remarks**
Hypersonalization and the disappearance of shared frames of reference	• No rules to address negative effects of hypersonalization/loss of truthfulness.	**Organizational:** • Information and awareness (guidance ethics) • Research	• The social effects of immersive technologies are still unclear. Further research is needed to clarify the possible effects. Proper supervision of the development of the technology seems to be the most appropriate instrument for the time being.

5. Misuse of immersive technologies by third parties			
Risk / issue	**Possible gaps in legislation and regulation**	**Regulation options**	**Remarks**
Monitoring and interception of data flows	-	-	• The existing legal framework is sufficient to regulate the monitoring and interception of data.
Influencing and manipulation	• Impersonating another person as such is not an offence.	**Legal:** • Criminalization of impersonation **Technical:** • Identification and authentication mechanisms **Organizational:** • Information and awareness	• In view of the major effect that impersonation can have on trust in (tele)communication, an impersonation ban should be considered. In addition or as an alternative to criminalization, technical possibilities for identification and authentication should be considered (electronic signatures, et cetera).