The Metaverse, Online Sexual Exploitation and Sexual Abuse of Children - a new challenge for today’s global society?

The objective of this short paper is to contribute to the discussion on the future of eXtended Reality Technologies and their implications for sexual exploitation and sexual abuse of children. The Open Source Intelligence Tool developed by the Dutch company Web-IQ, was used by the author of this article to search those areas of cyberspace where individuals with a potential sexual interest in children freely expressed their views among the like-minded. Their communication was searched using three search terms: „metaverse”, „virtual reality”, „augmented reality” and then analysed to find conversations that could suggest how the metaverse concept is understood in such environments. At the next step, these conversations were grouped according to recurring themes and finally interpreted. The approach outlined above has led to tentative but important insights that metaverse developers should take into account early in their work, if they want to prevent this concept from being affected by sexual exploitation and sexual abuse of children. In addition, this paper also calls for further research in this area.

The threat

There is no doubt that the threat of sexual exploitation¹ and sexual abuse² of children (CSEA), regardless of its form – offline or online – should be considered one of the most serious challenges for today’s global society. This society is currently witnessing worrying phenomena, especially with regard to the second form of this threat. Cyberspace, being so interconnected, has enabled child sexual exploiters and abusers to adopt technological tools according to their needs to spread their harmful practices. There can be only one interpretation of this situation: that the response to this threat so far has been insufficient.

According to Europol’s³ flagship strategic product – the Internet Organised Crime Threat Assessment⁴ 2021 (IOCTA) – which provides a law-enforcement-focussed assessment of evolving threats and key developments in the area of cybercrime, the new reality brought by the global pandemic „has also spurred innovation among cybercriminals, as they have strived to capitalise on new opportunities”⁵. Given the subject of this paper, it is worth addressing two key IOCTA findings regarding CSEA at this stage:

- there has been a steep increase in online grooming⁶ activities on social media and online gaming platforms;
- the production of self-generated material⁷ is a key threat. This material is displaying increasingly younger children⁸.

¹ Child sexual exploitation is a form of child sexual abuse that involves any actual or attempted abuse of a position of vulnerability, differential power or trust. This includes, but is not limited to, profiting monetarily, socially or politically from the sexual exploitation of another. This can be perpetrated by individuals or groups of offenders. What distinguishes child sexual exploitation from child sexual abuse is the underlying notion of exchange present in exploitation. There is significant overlap between the two concepts; because exploitation is often a feature of abuse, and vice versa. WeProtect Global Alliance, Global Threat Assessment 2021, 2021, p. 10 (accessed from: https://www.weprotect.org/global-threat-assessment-21/#report, 26.1.2023) and Interagency Working Group, (2016). Terminology Guidelines for the Protection of Children from Sexual Exploitation and Sexual Abuse, pp. 24–28 (accessed from: https://ecpat.org/wp-content/uploads/2021/05/Terminology-guidelines-396922-EN-1.pdf, on 26.1.2023).

² Child sexual abuse is the involvement of a child (anyone under 18) in sexual activity that he or she does not fully comprehend, is unable to give informed consent to, or for which the child is not developmentally prepared and cannot give consent. This is the definition of child sexual abuse adopted by WeProtect Global Alliance, based on World Health Organization guidelines. WeProtect Global Alliance, Global…, op. cit., p. 10.

³ Headquartered in The Hague, the Netherlands, Europol’s mission is to support EU Member States in preventing and combating all forms of serious international and organised crime, cybercrime and terrorism. Europol also works with many non-EU partner states and international organisations. Europol became an official EU agency on 1 January 2010 (accessed from: https://www.europol.europa.eu/about-europol, on 26.1.2023).

⁴ Each year, Europol’s European Cybercrime Centre (ECC) publishes the Internet Organised Crime Threat Assessment (IOCTA), its flagship strategic report on key findings and emerging threats and developments in cybercrime - threats that impact governments, businesses and citizens in the EU (accessed from: https://www.europol.europa.eu/publications-events/main-reports/iocta-report, on 26.1.2023). The author of this article contributed to the IOCTA during her service in the ECC.

⁵ Ibidem, p. 10.

⁶ Alternatively: “online enticement”.

⁷ Child „self-generated” sexual material is content of a sexual nature, including nude or partially nude images or video, that has been produced by children themselves. Child „self-generated” sexual material is not a harm per se (it can be produced voluntarily and shared as part of a developmentally appropriate exchange, for example, between adolescents). However, there are scenarios in which harm is caused, primarily: when a child or adolescent is coerced into producing „self-generated” sexual material and/or when voluntarily „self-generated” sexual material is shared against an adolescent’s wishes. WeProtect Global Alliance, Global…, op. cit., p. 11.

° The author is a former police officer and internationally recognised expert in the area of preventing and combating sexual exploitation and sexual abuse of children, currently working in NASK - National Research Institute; NASK is a National Research Institute under the supervision of the Chancellery of the Prime Minister of Poland (accessed from: https://en.nask.pl/eng/about-us/who-we-are/3261/About-NASK.html, on 23.1.2023); ORCID: 0000-0003-0633-4696.
The above findings are consistent with information from other reliable sources. According to the Global Threat Assessment\(^1\) 2021 by WeProtect Global Alliance\(^2\), the nature of harm has continued to grow and diversify, with the reporting of sexual exploitation and sexual abuse of children online reaching its highest levels. Evidence indicates an increase since 2019 in:

- the incidence of online grooming;
- the volume of child sexual abuse material available online;
- the sharing and distribution of child sexual abuse material (CSAM);
- livestreaming\(^3\) for payment\(^4\).

Confronted with these observations, it seems obvious that any efforts to prevent and combat CSEA should begin by recognising these phenomena as problems, not as „trends“. As such, these problems should always be considered first when making further advances in technology.

The challenge

While there is no single agreed-upon definition of the metaverse, it can be described as the idea or vision of the future internet, as a place where physical and digital worlds come together, offering users the next evolution in social connectivity and interaction. These features appear directly in the name „metaverse“, which is a promise of a multidimensional virtual space, not just the flat one, known so far. M. Ball, the author of one of the most award-winning books on the subject „THE META-VERSE: And How It Will Revolutionize Everything“ defines the metaverse as: „a massively scaled and interoperable network of real-time rendered 3D virtual worlds that can be experienced synchronously and persistently by an effectively unlimited number of users with an individual sense of presence and with continuity of data, such as identity, history, entitlements, objects, communications and payments“\(^5\). The term „metaverse“, as used today by several companies, refers to many different types of enhanced online environments, ranging from online videogames to virtual workspaces, dressing rooms and operating rooms\(^6\).

It seems that, thanks to recent serious investments in advancements of the immersive eXtended Reality Technologies (XR), including virtual reality (VR) and augmented reality (AR) by the leading tech companies, the metaverse is today closer to happening than it has ever been before. A detailed, especially technical description of these technologies goes beyond of the scope of this paper\(^7\). However, it is necessary to draw the reader’s attention to some basic elements of both VR and AR\(^8\). The VR we know so far creates a computer-simulated environment, enabling its users play an active role, i.e. to move freely and interact with virtual content. Its main tool is a VR headset, which generates a stereoscopic 3D effect with stereo sound. A combination of the VR headset and tracking the position of its user in space to orient a point of view in the system, provides a truly realistic experience. It is envisaged that this new generation of a virtual world, in which real people will be represented by 3D avatars, will be used for all kinds of social activity, starting from entertainment and work. On the other hand, AR can be understood as a „variation of VR“ where the goal is „to augment the real world with synthetic information, such as visualisations and audio“\(^9\). The main difference between these two technologies is that VR immerses its user into „a purely-synthesised informational environment“, making the user out of touch with the real world, while AR „allows the user to see the real world, but superimposes computer-generated information“\(^10\).

In the past decade, global society has witnessed how the digital environment has enabled child sexual abusers and exploiters to take advantage of such technological solutions as Tor\(^11\) and Virtual Private Networks (VPN)\(^12\). Given this experience, it seems clear that the concept of the metaverse – the primary advantages of which are social connectivity and interaction – may be particularly attractive to these child sexual abusers and exploiters, which may result in even greater levels of child victimisation. There has been some attention to AR and VR taking off in the adult sex industry (i.e. the development of immersive VR sexual games and films and ways to integrate haptic devices such as teledildonics), so there is some risk that online CSEA will adopt similar solutions\(^13\). What’s more, there are already disturbing signals that seem to confirm the thesis about the threat. In a recent BBC investigation, a reporter posing as a 13-year-old girl witnessed grooming, sexual material, racist insults and threats of rape in a virtual reality world\(^14\). Some worrying observations were also made regarding the alarming rise of online CSEA in the gaming environment\(^15\).

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\(1\) Previous Global Threat Assessments were published in 2018 and 2019 (accessed from: https://www.weprotect.org/global-threat-assessment-21, on 23.1.2023).

\(2\) WeProtect Global Alliance is a global movement of people and organisations. It consists of 100 governments, 64 companies, 85 civil society organisations and 9 intergovernmental organisations. The Alliance relaunched in 2020 as an independent organisation and is the combination of two initiatives: the European Commission and US Department of Justice’s Global Alliance Against Child Sexual Abuse Online and WePROTECT, established by the UK Government as a global multi-stakeholder response to combating online child sexual abuse (accessed from https://www.weprotect.org/about-us/who-we-are, on 26.1.2023).

\(3\) Livestreaming of sexual exploitation and sexual abuse of children is streaming this content in real-time over the internet. WeProtect Global Alliance, Global…, op. cit., p. 11.

\(4\) WeProtect Global Alliance, Global…, op. cit., p. 5.


\(6\) Ibidem.

\(7\) Ibidem.

\(8\) Ibidem.

\(9\) Tor – an open-source privacy network that permits users to communicate and browse the web anonymously.

The insights

As yet, there is no specific body of research into offender use of XR technologies, however, some interesting insights are already available, such as those included in the University of Manchester paper on this topic. In its chapter on future trends in XR and implications for online CSEA, the following trends in AR/VR developments and use were highlighted:

- increased consumer use of mobile AR;
- more uptake of self-contained, low-cost VR headsets and new applications;
- increasing audiences for immersive videos;
- the availability of 3D cameras for recording immersive videos;
- growth of the market for teledildonics and immersive sex toys.

To contribute to the discussions on this topic, the author of this paper used an approach similar to that used by Crisp analysts when studying the behaviour of criminals on the dark web, looking for new tools to aid exploitation. These analysts examined conversations that took place on various offender forums on the dark web, pinpointing what „technology topics” were discussed. These topics are presented in the chart below. It is important to note the high score of social platforms – 32.8% – which can be interpreted as unflagging interest of criminals in places where they can interact with children.

Figure 1: Technology topics discussed on dark web offenders forums

Following the above-mentioned approach, the research question: „what reactions and understanding does the metaverse concept receive among individuals who are potentially sexually interested in children?” was answered by learning directly from those individuals. A tool called Voyager, designed by Web-IQ – a Dutch company, leading in OSINT – was used to crawl particular areas of cyberspace. Using three search terms: „metaverse”, „virtual reality” and „augmented reality” in the Voyager’s modules, it was possible to retrieve original communication between individuals who – trusting in anonymity, which characterises hidden areas of cyberspace – felt able to freely express their views. The grouping of the Voyager results led to three main themes being defined; an example of each is shown and discussed below:

- XR technologies to facilitate access and interaction with real children in virtual environments;
- XR technologies to facilitate the production of CSAM, including virtual depictions of real children;
- XR technologies to improve the quality of existing CSAM.

Example 1: XR technologies to facilitate access and interaction with real children in virtual environments (the original spelling has been retained).

„so ive recently met a boy thats perfection. his voice to me is super attractive. i met him while playing a popular shooting game in a public lobby and i added him to friends list and invited him to play. hes 11 but very mature for being 11. i told him we should make a team together and hes been super excited and wanting to spend a lot of time with me i have his social medias even and he is 10/10. i figured i might be able to eventually open a trade with him and buy him things online but everytime i offer to get him something he says idk i have money so im running out of ideas the idea isnt for me to ask for sexual pics but to lure him into wanting to be with me more. lately he has been inviting me to meet him but im trying to build that relationship. any advice? some days he doesnt respond to me and i wonder if his friends tell him its weird that i want..."
to play and hang with him. I’m sure some of them do because these boys like to pretend they are girls on voice chat with other adult guys because of the high pitch voices they can do (which is totally hot btw everytime they do it with me in the party I get a boner) they moan and say heyyyyy daddy in the mic and I love it) but he told me he made his money from christmas and birthday money. He is super friendly with me when we are on our own and tells me all about his life. Lately he invited me into virtual reality and we have been hanging out in his vr room where all I do is go up to him and stare at his character and just wanna hug it and suck its little 11 year old dick but instead we talk and he shows me things in vr. I feel like I’m on to something but not sure what else to try because I don’t wanna lose him.

The example cited above perfectly describes one of the most common processes of online grooming, where “online environments allow greater access to victims and more opportunities for harm with fewer direct risks to offenders”30. In this particular case, the potential offender contacts the potential victim because he manages to get into environments popular among children: “I met him while playing a popular shooting game in a public lobby”. In this case, the contact evolves and moves from a public online space to a private one: “Lately he invited me into virtual reality and we have been hanging out in his vr room”. Once the first contact has been made, the man starts interactions which the 11-year-old boy, who may potentially be subject to engaging in sexually explicit conversation or sharing intimate photos or videos. However, in this particular case it seems that the man’s goal is something else: “the idea isn’t for me to ask for sexual pictures but to lure him into wanting to be with me more, as well as I feel like I’m on to something but not sure what else to try because I don’t wanna lose him”. Until then, he tries to get close to the boy: “He is super friendly with me when we are on our own and tells me all about his life and I figured I might be able to eventually open a trade with him and buy him things online”30. What is particularly disturbing this - much older - man “lately he has been inviting me to play with his other friends which are all the same age. I’m much older” knows the boy from social media “I have his social media” and probably knows where he lives “He lives close enough for me to meet”.

Example 2: XR technologies to facilitate the production of CSAM, including virtual depictions of real children (the original spelling has been retained).

“LOL! I don’t think you will need CP in the future because by then Virtual Reality will be so advance that you can have the experience you need in the virtual world where everything is just as real as the real world”. 

“CP - child pornography

Existing technologies enable the production of CSAM, both photos and videos of real children as well as computer-generated or other types of materials (i.e. manga cartoons). However, given the potential of VR and AR, the example cited above relates to already achievable goals “you can have the experience you need in the virtual world”. It is worth mentioning that there is evidence that the online distribution of CSAM contributes to the sustained trauma of victims31. In this context, it is easy to imagine that the impact of using a real child avatar in immersive sexual games and VR movies could only be greater. In addition, there can also be harm of a secondary nature, caused by the legitimisation and normalisation of such behaviours.

Example 3: XR technologies to improve the quality of existing CSAM (the original spelling has been retained).

“I truly wish could bring everyone Cyrus & Logan 3 remake in 4K, surround sound with cast interviews, fan extras and even a virtual reality edition... Sadly you’ll all have to make do with the pure golden original that I just tried to spice up a bit, hehe”.

The above example seems to be equally disturbing, because it is most likely related to an already existing CSAM called “Cyrus & Logan 3” (most likely titled after the names of the abused boys). Professionals dealing with online CSEA and investigating criminal behaviour will not be surprised by this example – they are aware that such people often feel attached to specific photos or videos. Bearing in mind what VR is particularly suited for, i.e. experiences that are rare and cannot be reproduced at will in the physical world32 it is easy to imagine that the “wish” expressed above can – at least technically - come true. If this happens, it will only contribute to further victimisation of children, whose visual representations will be used for such purposes. In this context existing CSAM can also be manipulated to suit someone’s expectations (with cast interviews, fan extras).

Final considerations

Since the metaverse will affect all kind of users’ cyberspace, it is our collective responsibility to guide the process of creating this concept in a responsible and careful manner, with particular attention to protecting the most vulnerable members of our society. In this context, the only way that statements available on the Meta website, such as “No one company can build the metaverse alone…” or “the metaverse isn’t just for gamers or developers, it will be for everyone”33 should be interpreted is that: no company should build the metaverse alone - everyone should do it34.

Recognising that the only way to solve the above problems is to continue international collaboration and cross-sector dialogue, the following recommendations on the topic of technology were included in the previously referred to document by WeProtect GA:

- online service providers must take a „Safety by Design”35 approach that includes impact assessing all products and services from a child’s rights perspective. Online service

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33 The University of Manchester, The Future of..., op. cit., p. 3.
39 More information can also be accessed from A. Phippen, Protecting children in the metaverse: it’s easy to blame big tech, but we all have a role to play, 2022 (accessed from: https://theconversation.com/protecting-children-in-the-metaverse-available-to-everyone-but-we-all-have-a-role-to-play-177789, on 29.1.2023).
providers should identify and, as appropriate, warn, expel and report actors who pose a risk to children;
- online service providers should publish regular transparency reports detailing the actions they take to reduce the risk to children online, and the mechanisms used to monitor their effectiveness;
- developers of online safety technologies should continue working to enhance the accuracy of age estimation tools, classifiers to detect unknown child sexual abuse content (including livestreamed content), and solutions to enable the detection of child sexual abuse online in encrypted environments. Open sourcing (with appropriate controls in place) should be used to encourage collaboration between relevant actors, and help set consistent standards for safety technologies.

In light of these recommendations, the role of alliances such as the Tech Coalition seems crucial. However, in fulfilling this role, they should be supported by other entities, especially those who can advise on CSEA offending pathways in the online environment. Given the concept of the metaverse discussed earlier, it is therefore imperative that any advancements within its scope, are aligned with a safety-by-design approach and understanding children’s vulnerabilities in the metaverse, to effectively prevent and eliminate all forms of CSEA.

An example of an approach that can be useful in preventing sexual exploitation and the sexual abuse of children in the metaverse involves creating personal boundaries in that aspect. For example, according to Meta, its recently announced Personal Boundary for Horizon Worlds (HW) prevents avatars from „coming within a set distance of each other”, creating „more personal space for people and making it easier to avoid unwanted interactions”[40]. This means, in practice, that users of HW can choose how they want to interact in their VR experiences.

Since research on this topic is in its infancy, a call for more research around the previously described themes seems entirely appropriate. There have been significant scientific advances in relation to CSEA in the last decade, which puts us in a better position to face this threat than we were in 2012, when we were beginning to understand the characteristics of internet offenders as they related to our extensive knowledge of contact abusers[41]. Let’s not miss this opportunity, because if that happens, the price we will pay will be too high.

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**Key words:** the metaverse, (online) sexual exploitation and sexual abuse of children (O)CSEA, child sexual abuse material (CSAM), eXtended Reality Technologies (XR), virtual reality (VR), augmented reality (AR)

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36. WeProtect Global Alliance, Global …, op. cit., p. 65.
37. The Tech Coalition is an alliance of global tech companies who are working together to combat child sexual exploitation and abuse online (accessed from: https://www.technologycoalition.org/about, on 25.1.2023).
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