THE MEANING OF VIRTUAL PRESENCE IN THE METAVERSE

An in-depth look at the key elements related to our virtual presence in the Metaverse: Digital Embodiment, Asset Economy, Creator Economy and much more.

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WHEN WE TALK ABOUT VIRTUAL PRESENCE, WE IMMEDIATELY THINK OF AVATARS.

BUT VIRTUAL PRESENCE IS WAY MORE THAN THIS, AND IT INVOLVES MANY TOPICS THAT WILL BECOME RELEVANT IN THE FUTURE.

CONTENT

EVOLUTION OF COMPUTATION

When the computer and corresponding accessories evolved, they gave us new possibilities for what to do and how to do it. However, with their occurrence they also started to limit us as humans in how we interact.

Accessories like the mouse and the keyboard coming with computers enabled us to interact with technology, but at the same time limited our interactions to simple dragging, clicking, selecting and typing, whereby we in the real world interact with our full body. We move around, we grab, we pinch, we carry out all sorts of interactions coupled with the movement of our body. Over time, more and more of our day-to-day activities turned into something that could also be done or experienced digitally, bound and compressed for the output of a two-dimensional interface.

This change does not just include work, although computing in the beginning of course had the biggest impact in that sector; it also expands into private life, and affects areas like social activities or healthcare with real-time remote patient monitoring, as also these social face-to-face experiences got digitized and now happen within the framework of 2D.

Content that was three-dimensional and allowed to be touched, felt, tasted or smelled, and that offered the highest grade of immersion we know, got abstracted from the real world to be displayed on two-dimensional screens. Everything turned from being three-dimensional to being something two-dimensional, composed of buttons, handles and switches as we still know them today. Even the experience of sound became limited, and turned from being something spatial, which helps us to understand as well as navigate a three-dimensional space, to something directional.

With the rise of mobile computing and latest technology, for example video calls, computing has already taken a big shift in comparison to the past. However, although computing became mobile and new accessories enabled more diverse interactions, computing is mostly still bound to the two-dimensional space.

Even today with video conference tools such as Zoom, Microsoft Teams or Webex, which all played an important role throughout the Covid19 pandemic for many people, as they allowed us to meet and see each other in times of hard lockdowns, we are still facing restrictions and are limited in our interactions and communication compared to how we would interact without the computer being part of the equation.

Although, in theory, we would have the ability to use our body language, our gestures, and our mimic as we would regularly use them, since we can transmit an image of us via the camera, it still does not come close to the level of detail we would have in a face-to-face communication due to still existing restrictions.

The fine nuances in our faces that make up a lot of our mimic to express our emotions simply get lost within small video views, gestures are potentially occluded or cut off by the camera view, and as in most cases, we are not recorded in full size so the body language cannot be used to strengthen our point and enhance our communication.

It simply feels like it costs us more energy to convey the same information when restricted in our ability to communicate with our body. That this hypothesis is not that far-fetched, is strengthened by a Standford study in which the psychological consequences of spending hours per day on video calls was analyzed.

Researchers found that not only do video chats dramatically reduce our usual mobility, but also that excessive amounts of highly intense close-up eye contact, constantly seeing oneself during video chats in real-time, and having to actively deal with the question of how we correctly communicate nonverbally, which comes natural to us in our face-to-face interactions and gets interpreted subconsciously, leads to higher cognitive load in video chats[1].
All of this makes up the phenomenon which is commonly known as Zoom fatigue.

So, although we know that hybrid work, meetings, and conferences came to stay as the shift towards hybrid or remote work got fuelled up by the pandemic, currently in the two-dimensional space we seem to have no real solution to make computing more natural and human.

THE NEW ERA OF COMPUTING

The rise of new technology and its establishment on the market allows us to interact with technology as well as with each other differently, as we already outlined in the Reply report of “Designing for the next dimension – From 2D to 3D design”[2].

We can recreate real life experiences better via new XR technology as we can bring back modalities and interactions that determined our interactions and experiences before the rise of the computer. Furthermore, we will be able to shift from the two-dimensional space back into the three-dimensional one.

Therefore, we can create immersion within the digital through new kinds of technologies, so that users of different experiences will be able to fade out and forget the real world around them through the audiovisual impressions. We will start to see real-time experiences in which we interact with interfaces and digital objects more naturally within the real or virtual world through enabled devices.

The more sensory input is supported by the experience, the more immersive it will become and enhance memorization of our actions, which can specifically be used for virtual training. Right now, most apps use visuals as well as spatial audio.

But, as humans have more senses that can be served, we could go even further and increase the level of immersion by appealing to other senses.

Therefore, haptic feedback and even thermal feedback are being evaluated in the Reply Spatial Computing Community of Practice to increase immersion of MR/VR experiences[3].

Enabled by this new technology, we could now start to immerse ourselves in digital worlds and start to meet each other digitally by having the face-to-face feeling we would have in reality, allowing us to dissolve the two-dimensional frame around an experience. In this digital world, we could collaborate and work together via meetings in immersive business meetings supported by Metaverse platforms.

We do not need to spend time and money on travelling long distances, as we could attend digital conferences or sport courses from the comfort of our own home via Metaverse platforms as well.

We can collaboratively come together to play with or against each other on other Metaverse platforms or in online games, through which we feel far more connected than we are used to from two dimensional games. We can feel as though we are actually in the same place, even though in reality, we might be a thousand miles away.

Therefore, the key achievement of this new technology for us is that new feeling of presence, connected to experiences digitally created by computers.

It is often defined that “Presence is also a person’s ability to make his or her character known to others”[4].
Therefore, if we feel someone’s presence in a place, to us it indicates the fact that this person is there[5].

Virtual presence can therefore be defined as the feeling of being present in a virtual environment or virtual reality that seems plausible to our brain.

VIRTUAL PRESENCE

As discussed, digital social experiences are changing, and therefore virtual presence (our virtual representation in the form of avatars in the digital space) is becoming more and more important and relevant.

Especially when we get in contact with others and start to communicate or collaborate with them; we want to be able to express ourselves and feel represented.

This virtual presence is therefore connected to a lot of individual puzzle pieces that need to come together to make up a good feeling of that presence, which we will outline in the following.

DIGITAL IDENTITY

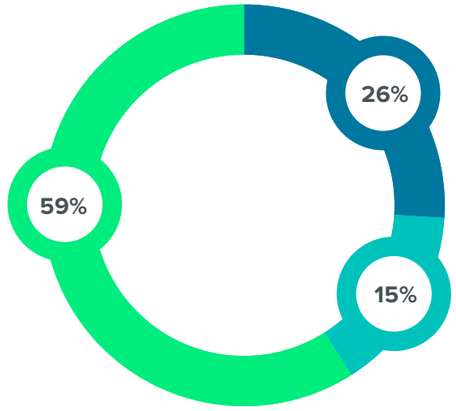
Like our profile pictures on social media, the avatar is a crucial personalized element for our interactions within the new digital space, in current times better known as the Metaverse.

We want to feel represented if we get into interpersonal interactions or collaborations with others.

As our avatar is our digital human representation and the virtual presence of our digital identity, we want to be able to identify ourselves with it. For example, with Mesh for Teams, users will have a unique, personalized avatar and be able to join any Microsoft Teams meeting and regular video calls, represented as their own avatar.

Whether this digital identity is an almost identical clone of our real physical embodiment differs from person to person. We ran a small poll with 27 participants and asked people whether they would create avatars looking like themselves or not.

Avatar Representation



- **26%** Avatars that look like me
- **15%** Avatars not looking like me
- **59%** Depends on platform / context

Fig. 1: Results from poll regarding the question of “What kind of avatars are you creating?”

59% said that this decision for them would highly depend on the platform or context. Only 26% said that they would try to recreate themselves as best as possible for their digital identity.
Leaving 15%, that said they would create avatars not looking like themselves at all.

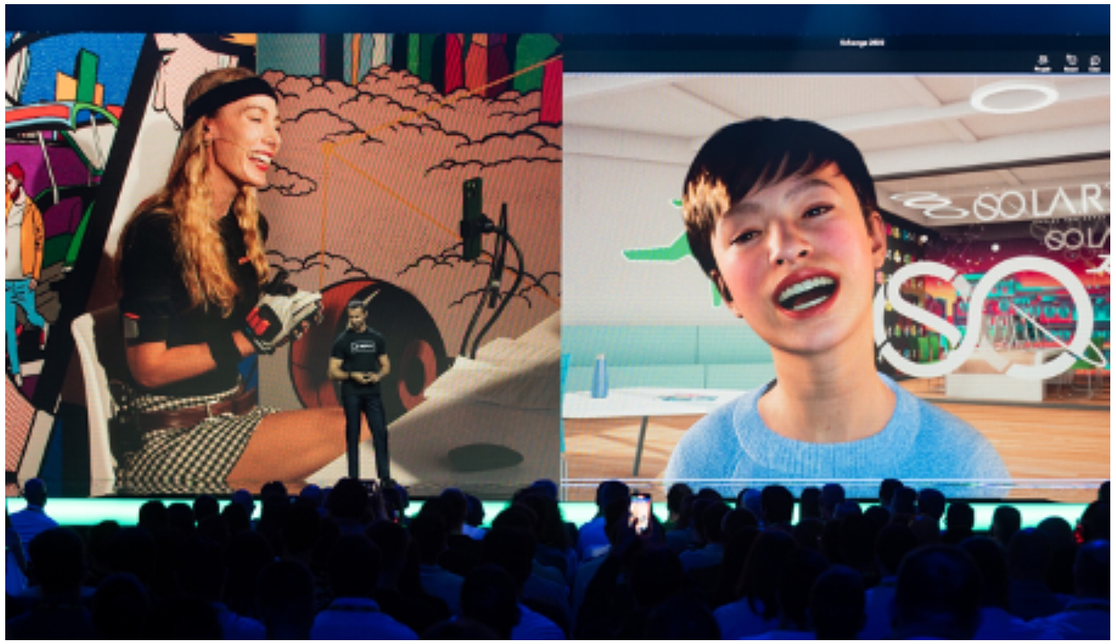


Fig. 2: ROSE Digital Human demo at Xchange with an actor leveraging facial and body tracking for real-time animation of a MetaHuman avatar.

This, for us, shows and strengthens the assumption that it is less important how exactly the avatar looks, but rather that it is important how represented we feel by this avatar on a given platform or context.

Avatars these days are typically simple 3D comic-like styled models, but there are already more realistic representations like EPIC's MetaHumans[6] providing photorealistic digital humans, which often are not really scalable for large online worlds with today's resources, but are providing a glimpse of how hyper-realism will impact the Metaverse for future, more lifelike experiences.

The technology is already here and can be used for certain use cases.
In fact, at the Reply Xchange 2022 conferences, Reply's CTO Filippo Rizzante had a live conversation on stage with an avatar: this was our so called "ROSE Digital Human demo," where an actor behind the scenes was leveraging facial and body tracking systems that were driving the real-time animation of a MetaHuman avatar with the Unreal engine.

Even AI solutions exist with platform interoperability like the Estonian startup Wolf3D with their "Ready Player Me" platform that can turn a simple picture into a 3D avatar, getting closer to the actual visual look of the person.

Often, however, the uncanny valley effect can be observed.
If avatars try to look too real or do not behave as expected, it rather results in an unpleasant emotional response to the subject, as they are not 100% realistic and therefore ruin the immersion.

Fig. 3: Different Virtual Representations of Nils-Christoph Högemann

TOWARDS DECENTRALIZED DIGITAL IDENTITY

Today, there are already a lot of avatar systems on the market. The challenge we will be facing with all these avatar systems is the centralized nature of the current Metaverse platforms built by large tech companies.

The avatar and the identity are often linked to the platform where they were created, which means users will have to create avatars for each platform individually.

That means not just extra work, but also entirely different visual styles that are not shared between each other, and a disconnected visual appearance without persistence between platforms.

What users really want is an open interoperability with persistence foremost on the avatar level, so they can take their digital human visual presence with them while surfing different Metaverse spaces and platforms.

Physical identity is a very important aspect of every human being, and this can be applied to the digital human as well, where avatars must become interoperable so users can share their visual representation between Metaverse spaces.

Decentralized identity systems based on blockchain could be a solution for this, where platforms don't own the user's identity or store their virtual presence, but the user himself is the owner with their private key. In tandem with Metaverse, there's currently a lot of hype with the Web3 standard, which is trying to achieve decentralized identity.

To get an **overview of different avatar systems** and see where we stand with current avatar solutions when talking about key assets like interoperability, we at Reply conducted a market analysis and created an overview of our main findings, presented in the following.

SOLUTION / VENDOR	LINK	AVATAR CUSTOMIZATION	PLATFORM SUPPORT	SDK / API AVAILABILITY
Ready Player Me by Wolf3D	https://readyplayer.me/en	✓	Avatars are currently supported in 1330 apps (including e.g. VRChat or Spatial)	✓
Meta Avatars by Meta	https://developer.oculus.com/documentation/unity/meta-avatars-overview/	✓	Usage within Meta ecosystem. 32 pre-made reference avatars however are available for representation of users on platforms without a Meta login, like SteamVR.	✓
Osuvox	https://osuvox.io	– Only avatar body is customizable. The head is a fixed NFT.	Interoperable within a multitude of metaverses and games such as The Sandbox, OVR, Arcona and others.	✗
Tafi	https://maketafi.com/Astra-SDK	✓	Usage only with dedicated integration	✓
MetaHuman by EPIC Games	https://metahuman.unrealengine.com	✓	Usage within applications created with Unreal Engine.	✗
Character Creator by Reallusion	https://www.reallusion.com/character-creator/	✓	Usage with iClone, Maya, Blender, Unreal Engine, Unity, or any other 3D tools.	✗
iGoodi	https://acommerce.igoodi.eu/pages/avatar	✓	-	✗

DIGITAL EMBODIMENT

As outlined previously, for our communication as humans, our body movement as well as our gestures and mimic are crucially important.
To create a good feeling of presence, therefore, it is important that these facets of our communication are transferred to our digital representation as well as possible. The higher the level of accuracy, the better our perception of the real embodiment of ourselves. Also, these influence our perception of others.
The higher the level of accuracy, the more we have the feeling that someone else is really there and communicating and interacting with us.

Our perception of one another therefore highly depends on the level of accuracy we can achieve. We could see that the tracking of our poses and body movement via body tracking, hand tracking, controller tracking, or head tracking is becoming crucially important to creating good digital body language.

Beside the mere tracking of movement, **it will further become crucially important to mirror the movement that happens in our faces**. The way we look at each other, how we roll our eyes or move our mouth, tells us a lot about our emotions as well as our intention.

Therefore, gaze tracking, eye tracking, or audio input tracking also become important puzzle pieces to make up a good virtual presence, as they can be used to recreate a sense of our mimic, even though we are not yet tracking every little detail of our movements.

Fig. 4: Avatar Customization on the Metaverse platform Spatial

ASSET ECONOMY

As our digital identity is our unique identity, as it would be in the real world, of course it is not only the digital avatar as such that matters, but also how it appears visually. Like in real life, we want the ability to restyle for different occasions such as work, sport, conferences or other scenarios as we would in the real world.

Fashion is one of the main ways we express ourselves, which explains why avatar fashion is apparently a growing market. Retailers and fashion brands are already entering the market, and many, including luxury brands like Gucci that sell virtual handbags, sneakers and more, are very successful and making millions in the Metaverse.

But fashion is by far not the only category within this new asset economy. Virtual goods and gadgets of any kind will become relevant in these new contexts. Already today, gamers spend over 100 billion dollars every year on virtual goods and fashion for their avatars[7].

Furthermore, as more and more people are building personal spaces or worlds, assets like furniture and 3D models of any kind will gain more and more relevance over time.

With the idea of the Metaverse and the rising importance of virtual presence, this opens up a whole new field of business for brands as demand for these digital assets is growing alongside the persistent growth of experiences within the Metaverse. In order to attract and gain new customers in the future, businesses will need to be ready with a solid strategy for how they want to become active in the Metaverse.

New opportunities could be manifolded. Through cross-world commerce approaches for example, customers could buy a digital clone together with the real physical asset so that they could for example place the same furniture in their virtual environment that they have at home, or wear their favorite piece of clothing when represented in the virtual world through their avatar.

This would be a direct transfer from existing business cases such as buying a physical book that comes with a code, enabling users to also unlock the included content digitally.

Fig. 5: Concept of digital fashion clones

But of course, businesses could also focus on selling digital goods alone, which may or may not be coupled with special ownership privileges, for example offering access to a valuable ecosystem of experiences of a given brand – an example here would be the MetaRing by Venly.
The MetaRing NFT gives the user access to exclusive locations across different virtual lands, platforms and games.
The virtual ring offers unique benefits and can unlock special in-game utilities and early adoption access[8].

These pure digital approaches are not only limited to the virtual world, but would also have an impact on the real world when it comes to the real world Metaverse enabled by new augmented reality technology, as showcased by DressX. DressX set out to be the digital closet offering NFT-based fashion collections that can be worn online; either via augmented reality or as digital assets (including on a digital avatar[9]).

As outlined before, opportunities are manifolded, and creativity is the limiting factor when it comes to the definition of new business opportunities for retailers and brands. It is just important to find a strategy for the Metaverse that also reflects and matches the brand's identity.

BREAKING OUT OF THE WALLED GARDEN

A challenge we will be facing with all of these new opportunities, however, is the missing interoperability we already discussed for the avatar itself.
Often, digital assets and goods are also strictly linked to the platform they were created or bought on, and the large platforms are building walled gardens without interoperability yet.
Therefore, users are not able to take their belongings with them while surfing different Metaverse platforms, which will be a problem as users are forced to buy assets anew on different platforms, or even to build up different asset stock on different platforms, as they are not all offering the same assets.

Though blockchain technology has yet to be evolved to be sustainable and scalable, blockchain and similar decentralized protocols might become important when it comes to the ownership of all these assets and their interoperability, especially if they are unique.
Together with NFTs, blockchain could be used for linking the actual avatar asset, so it is ensured that platforms do not own the avatar but rather own the user himself, who identifies with his unique key wallet.

CREATOR ECONOMY

Together with the rising importance of digital assets and goods, the creator economy could become an important puzzle piece for virtual presence, as creators and creatives will provide us with the assets and goods needed to customize our digital identity as well as our new digital environments. When we take a look back in history, it shows that the pattern of the evolution of this economy usually takes place in three phases, which Jon Radoff describes in his article "Evolution of the Creator Economy"[10]:

- "The **Pioneer Era**, when first-movers like Amazon or Pixar created their own technologies."
- "The **Engineering Era**, when bottoms-up tools and middleware emerge to support overwhelmed engineering teams."
- "The **Creator Era**, when top-down tools emerge to support a much larger market of creators and disrupt many of the businesses of the prior eras."

Jon Radoff also discusses many other interesting aspects in his articles, and we were able to interview him for our new Metaverse series: Meta Minutes. You can watch the episode with Jon where he talks about his Seven Layers of the Metaverse and the Creator economy here[11].

These different eras can be seen today in many areas such as desktop publishing where Adobe revolutionized the desktop publishing market, in e-commerce where services like Shopify simplified the creation of online shops for the mass, or game development where 3D engines like Unity or low-code / no-code 3D tools like SparkAR (or Lens Studio) allowed storytellers and artists to create their own experiences without detailed knowledge of coding.

As the Metaverse as a real-time immersive experience – and especially the virtual presence coming with it – is clearly fuelled by assets and content, simplified and easy-to-use tools will become important in empowering creators to create content without high effort, enabling them to be more creative and create experiences that stand out without needing to care about the heavy lifting. Easy-to-use tools provided by the existing Metaverse platforms as well as services allowing the creation of assets across platforms will be key to fuelling the Metaverse and giving creators the freedom to create, distribute and monetize their creations by selling them on dedicated digital marketplaces and having the ability to radically democratize the market.

Hand in hand with the monetization of work is the second most important part of the creator economy; the ownership over the created work in form of content ownership, where the platform technically does not own the content that users create, but the user himself does. Like for assets, blockchain and similar decentralized protocols might become important for this ownership, and together with NFTs could be used to link the creation to the creator and create retractability in transactions that allow new digital forms of monetization, as creators of the content could start monetization of further resales of their work and therefore profit; potentially making a living out of their work, further fuelling the growth of the market.

Furthermore, the tools and technology that come with the creator economy can also benefit us as end customers, as we could use these tools to design virtual goods, virtual fashion or even full avatars that could be linked to us via NFTs on the blockchain.

SECURITY & PRIVACY

An important part of the virtual presence and how users are seen in these large online worlds is through responsible usage and the implementation of good and solid digital ethics.
Avatars also provide a great opportunity for diversity & inclusion, since people can represent themselves digitally with their true self and identity. Whilst it is great to use an avatar that does not necessarily reflect the physical appearance of the user, it can also be problematic with anonymization. Even today, users sometimes get harassed in online games where abusive users hide behind anonymized avatars. We're already starting to see cases on Metaverse platforms. Only in February 2022, BBC revealed child safety issues on VRChat[12], but we can also see this harassment and unwanted behavior on other platforms like Horizon Worlds and others[13]. Bullying, misinformation, harassment, and racism can become a real problem, especially in these immersive worlds, as the experience furthermore feels real. This must be taken care of with ethical and responsible regulations, providing a safe space for every human being. AltspaceVR for example recently removed certain hubs / spaces and added features to make AltspaceVR a safer place[14].
But other platforms are also already starting to take action. For example, Meta reacted to identified problems by rolling out safety bubbles, guaranteeing users their private space by preventing other avatars coming too close. Rec Room is likewise testing ToxMod, an AI powered speech recognition and analyzation software by Modulate[15], which is able to predict racist language or harassment and alert a human moderator to step in[13].

Besides security, privacy is another important aspect that comes with some serious concerns. Even today, we as users of a given product know that we are heavily tracked and that big tech companies are gathering millions of data points across platforms about us and our behavior in order to tailor advertising campaigns. Compared to traditional sites, on the Metaverse platforms that are coupled with new technological gadgets, companies today are able to monitor us in even more detail.
Enabled by the technology and the changing nature of our interactions on those platforms, they are now able to monitor even our biometric data, our movement, our facial expressions, and could even have access to what we see and when we look at it via eye tracking, so that we as users become even more transparent.

In order to eliminate concerns surrounding security and privacy, ethical and responsible regulations are needed, providing a safe space for every human being. This of course implies that we require the highest level of security and privacy technology in order to make it a pleasant future for everyone, and not turn the Metaverse into a dystopian OASIS[16].

CONCLUSION & OUTLOOK

Although virtual presence at first glance seems to be coupled only with avatars, as outlined within this report, we can see that **virtual presence is more than just avatars** and comes with many corresponding topics that will become relevant in the future.

With the avatar itself, new technology when it comes to embodiment will be needed in order to map our real-life body language, gesture as well as mimic best to our virtual representation, so that we feel as represented as possible when getting into interpersonal interactions with others on Metaverse platforms.

Furthermore, digital fashion will become an important market as we want to express ourselves and express ourselves often, doing so through what we wear. Because of this, we already see many fashion brands entering the Metaverse and making millions by selling digital goods.

This market is expected to grow as the Metaverse gains more importance and relevance with more and more people. Aside from fashion, we can expect that digital goods in general will become a more important market. If more and more of our activities happen via Metaverse platforms, digital goods of any kind will gain more relevance and importance to end customers, as they will start to customize their digital environments more and more. To fuel these new growing markets, dedicated assets and content are needed.

This content needs to be created by someone, which opens up the field of the creator economy, which will become more relevant with the uprise of the asset economy. Therefore, easy-to-use tools for creating that content will become important for empowering creators to make content without high effort. Furthermore, it will become key to enable creators to monetize their work. It will be important that creators have content ownership, rather than the platforms or tools which are used.
To tackle the challenge of the missing interoperability of avatars as well as digital assets, blockchain and similar decentralized protocols are becoming more important.

Together with NFTs, blockchain protocols could be the key enabler to break out of the centralized nature of Metaverse platforms we see nowadays. Furthermore, decentralized protocols with NFTs provide an opportunity for creators not just to monetize their digital work, but also to ensure their intellectual property. The work of the creator linked to the blockchain as NFTs can achieve retractability in transactions that can't be altered, and ensures original authorship is maintained.

But, in order to make the Metaverse a safe and confident space for all human beings, ethical and responsible regulations are needed. To ensure it, the Metaverse will require the highest level of security and privacy technology to make it a pleasant future for everyone, and not turn the Metaverse into a dystopian OASIS.

To put it in a nutshell, all discussed puzzle pieces brought together in the right way will enable us to make the Metaverse something that is enjoyable.

That is why we, at Reply, are currently exploring each of these aspects in detail and are excited about the opportunities that will arise.

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Fig. 1 Results from poll regarding the question of “What kind of avatars are you creating?”

Fig. 2 ROSE Digital Human demo at Xchange with an actor leveraging facial and body tracking for real-time animation of a MetaHuman avatar.

Fig. 3 Different Virtual Representations of Nils-Christoph Högemann

Fig. 4 Avatar Customization on the Metaverse platform Spatial

Fig. 5 Concept of digital fashion clones

WITH THE GROWING HYPE AROUND THE CONCEPT OF THE METAVERSE, WE AS REPLY ARE WORKING TO DEFINE THE KEY ELEMENTS TO BE CONSIDERED IN THE ROADMAP TO DEVELOP A SAFE AND CONFIDENT ENVIRONMENT.