

XR FOR EVERYONE

# NEW HORIZONS<sup>x</sup>

UNITING THE XR COMMUNITY, INSPIRING CREATIVE MINDS AND DRIVING BUSINESS FORWARD

**LOVING  
A MACHINE**

06.

Emotional relationships with  
virtual beings

**RACISM IN XR**

12.

Why are there no avatars  
that look like me?

**THE FUTURE  
IS FEMALE**

24.

XR is a man's world, but it  
doesn't have to be.

**CENTRE STAGE**

48.

Immersive experiences at  
London's National Theatre

**XR FOR DUMMIES**

A not so intimidating guide for everyone

**GET INTO THE  
MOST IMMERSIVE  
EVENT OF 2020**



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opening 17th September

# NEW HORIZONS

## WELCOME TO VRDAYS 6: THE MOST IMMERSIVE EVENT OF 2020



It's been a year since the coronavirus first appeared in Wuhan, China. With nearly one million deaths across the globe, it is an unprecedented human tragedy.

We didn't know what we know now, in March of 2020, when we completely virtualised Laval Virtual, precisely by using virtual reality. With increasing responsibility we made the decision to also virtualise VRDAYS Europe 2020. We don't want to jeopardise the health and safety of our partners and exhibitors, our speakers and our visitors.

Fortunately, the advanced technology that we promote happens to be the perfect solution for organising events and to overcome restrictions. In fact, we have hosted dozens of virtual events since April. A positive side effect is that virtual worlds are finally perceived and understood as credible alternatives to physical environments, whether it be for professional or public events, offices or meeting rooms.

What if these virtual solutions help to reduce international travel in the long term? What if working remotely helps to

reduce our daily commute? You no longer need to travel an hour from the suburbs to work, you no longer need to spend money on transport, to burn fuel and emit extra CO2. Even office buildings have become redundant! Think about how we can save the environment, the planet - and us? The 2020 edition of VRDAYS Europe, will try to make you even more aware of the world we live in, both physically and virtually. Hopefully it will persuade you to tell your friends that we need to speed up this process. The solutions for our problems already exist - now it's time to invest, test, improve and use that technology wisely. Hopefully, that will save more lives than we lost due to COVID-19.

WARM REGARDS,



LAURENT CHRÉTIEN

CHAIRMAN VRDAYS AND CEO LAVAL VIRTUAL



# WELCOME TO VRDAYS 6!

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I'm so happy I am able to say this to you after such a tumultuous year, but with perseverance, a great team both here and in Laval, and the most wonderful support from our partners, we are able to bring another dazzling event to you, into your homes, wherever you are.

With this magazine we hope that you feel connected to us, even though we can't all be together. Just a little bit of Amsterdam and VRDays delivered to your home. We hope you enjoy the great articles that our friends and colleagues have so generously contributed, to keep us informed and up to speed on what's happening in our amazing industry - we hope that it inspires you.

Finally, I deeply thank you, our guests, our readers, our trusted companions along this wonderful and sometimes rocky road. Also many thanks to the Kromhouthal and Smile Licht en Geluid for working with us to make our crazy hybrid and live streamed event come to life. This has been a challenging yet exciting year for everyone - and we couldn't do any of this without all of you!

KEEP THE FIRE  
BURNING,



**BENJAMIN DE WIT**  
FESTIVAL DIRECTOR



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## XR FOR DUMMIES

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Immersive technology can be daunting. A myriad of technical jargon and rapidly evolving hardware, what's current one day is obsolete the next.

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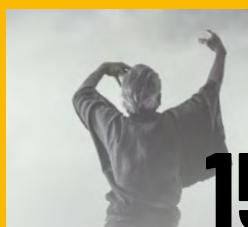
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# SCHEDULE

**NOVEMBER 4TH**

## VISION & IMPACT CONFERENCE

Livestreamed and in the Kromhouthal  
for 200 lucky people

**NOVEMBER 5TH**

**NOVEMBER 6TH**

**LIVESTREAMED CONFERENCES ON 2 CHANNELS**

**CHURCH OF VR** Oculus TV

**EXHIBITION** Laval Virtual World

**IFM LIVE PITCHES**

Zoom

**IFM ONE-TO-ONE MEETINGS**

Zoom

**HAMLET'S LUNACY** Brakke Grond Live Performances



# IFM

IMMERSIVE  
FUNDING  
MARKET

The Immersive Funding Market brings together the most innovative ideas throughout the XR ecosystem and introduces them to potential partners that can help to realise their full potential. From fully immersive narrative journeys, to game-changing tech startups, to XR academia that will shape the future of the industry.

The benefits and potential of immersive projects are fast growing and wide-ranging, and our passionate belief in these ideas is what drives what drives IFM.

This year we are organising three events focused on these three target groups. Each event consists of a live pitching session (open to the public), and matchmade 1-to-1 meetings (invite only).

## ART

IFM Content is an opportunity for financing, distribution, and connection to potential partners for content creators, organised in collaboration with IFFR Pro (International Film Festival Rotterdam). Our focus is on fictional narrative projects and nonfiction projects with a highly creative approach. Narrative project creators present their unfinished works to industry partners and decision makers to help realise these creations.

Select projects will also be invited to the IFFR Pro CineMart, taking place January 30 to February 3, 2021.



**IFFR PRO**

## BUSINESS

IFM Startup connects startups and scaleups with capital, facilitating deal-flow for attending global venture capitalists.

Organised through our partners the XRBASE Investor Event, we seek out Europe's top XR companies looking for Early Stage and Series A investment to take part in this event.

For 2020, our main selection criteria is companies who have adapted and found creative solutions to the worldwide changes brought on by COVID-19.

Meet startups ranging from training, co-working & virtual conferencing, to new XR platforms, cloud solutions, and deep or cross tech innovations.

**BASE**

## SCIENCE

IFM Research bridges the gap between academia and industry, taking XR researchers working at the top of their field, and introducing them to a powerful network of entrepreneurs and corporate potential.

We bring cutting edge academia into contact with future-driven companies to create an environment where businesses can leverage research from all around the world, and academia can find funding, quality case studies, and industry collaborators.

From data visualisation to social impact, from XR philosophy to immersive audience metrics. Researchers from all academic disciplines are connected with industry partners, NGOs, and entrepreneurs.

# A NOT-SO INTIMIDATING XR GUIDE FOR DUMMIES

IMMERSIVE TECHNOLOGY CAN BE DAUNTING. A MYRIAD OF TECHNICAL JARGON AND RAPIDLY EVOLVING HARDWARE, WHAT'S CURRENT ONE DAY IS OBSOLETE THE NEXT. BUT IT DOESN'T NEED TO BE A MINEFIELD. PETER GRAHAM TEACHES A FEW BASIC FACTS THAT CAN HELP YOU CUT THROUGH THE RUBBISH YOU DON'T NEED, TO GET TO THE VITAL HEART OF THE INDUSTRY.

## First and foremost, what the hell is XR?

This was coined in recent years as an umbrella term for each section of the industry; virtual reality (VR), augmented reality (AR) and mixed reality (MR). VR refers to headsets like Oculus Quest or Valve Index. AR tends to be the digi-

tal overlays you find on smartphones (think AR emoji) and MR combines real and virtual interactions on devices like Microsoft's HoloLens or Magic Leap. There is also a massive crossover between AR and MR, which makes them more confusing.

## HEADSETS, SO MANY HEADSETS!

BEFORE YOU GET THAT CREDIT CARD OUT, THERE ARE THREE AVENUES TO EXPLORE – STANDALONE, PC AND CONSOLE – ALL DEPENDING ON WHAT YOU ALREADY OWN, OR ARE WILLING TO SPEND.

### Do you have a PlayStation 4?

1  
YES

Then PlayStation VR is good for VR gaming, and cheap.

NO

Move on, as there's no point in buying a PS4 just for PSVR.

## PETER GRAHAM

Senior Staff Writer at VRFocus who has reported on the XR industry for the last 5 years, Peter writes daily about the latest advancements in the consumer and enterprise space

### Motion sickness in VR, will it affect me?

A real grey area this one, as the topic is so personal to each person. A VR experience might be comfortable for one user but make another really nauseous, due to how the brain interprets virtual movement. The best course of action for anyone new is to take it slow. Go for a nice seated experience with interaction, but not too much intense action. Best advice: if you've just bought a headset, don't rush into some multi-player battle royale. Try a nice animated film or puzzle title first. Maybe also avoid anything scary as you might fall to the floor screaming.

Peter Graham



# 2.

YES

#### Do you have a decent, VR-capable PC?

Headsets like Oculus Rift S, Valve Index and Vive Cosmos are where you're headed.

NO

It's going to get a little more complicated and expensive, delving into PC specs and how immersed you really want to get. PC VR does provide the ultimate in VR though.

# 3.

#### None of the above?

Then go for an all-in-one headset (no external PC and console needed). Commonly referred to as 'standalone', it's like having a PC on your face and the whole reason why Facebook's Oculus Quest has been so damn popular and successful. The solution is as simple as VR can be and the price isn't wallet busting. Its closest rivals are HTC's Vive Focus Plus or Pico Neo 2 but they're generally focused on business use cases, like training new employees or conducting remote meetings.

# WHEN THE AUDIENCE BECOMES THE ARTIST

THE PANDEMIC FORCED US TO MARVEL AT ART FROM A DISTANCE, VIRTUALLY INSTEAD OF PHYSICALLY. BUT PIONEERS LIKE JUDITH GUEZ WANT TO TAKE IT A STEP FURTHER, BY ALLOWING VIEWERS TO NOT ONLY SEE ART, BUT TO EXPERIENCE, TOUCH AND EVEN CHANGE IT.

‘The function of a museum should not be to show us things, but to make us see them, to measure ourselves against the objects on display’, said the French author J. M. G. Le Clézio in 2011.

But how can we measure ourselves against works of art, when we can’t experience them physically? The COVID-19 pandemic turned our world upside down, art fairs were cancelled, museums were closed for months and we could only view their collection online. But it’s challenging to create the same visitor experience

in a virtual museum and to build a relationship between the viewer and the object. It’s also difficult to understand the artist’s intentions when you are not physically present.

‘Art cannot be presented in the same way as a physical exhibition, because you’ll lose the meaning of the piece’, explains artist-researcher Judith Guez, who has a PhD in Virtual Reality and Mixed Reality. She is interested in the relationships between viewers and art, using immersive technology. In 2018,



Guez founded Recto VRso, with Laval Virtual. She now presides as the artistic director of the festival. Recto VRso aims to invite artists, researchers, students and explorers who question the virtual reality medium, directly or indirectly, to bring out new artistic forms.

'That is why we developed a virtual world for Recto VRso 2020, leading up to the physical exhibition Real body - Virtual body, which can be seen in April of 2021 in Laval, France.' The virtual world shows us the same location

where the exhibition was to be held; a glorious 17th-century chapel, perfectly replicated in 3D. In her creation, Guez goes beyond the ordinary museum structure, beyond what we experience with Google Arts & Culture or virtual museum tours. She uses the virtual space to tease us, before you immerse yourself in next year's physical exhibition.

It is important to distinguish between virtual tours with a 360° view, and digital art using VR/MR technology.

## MARIE LEBLANC

Marie worked as Industrial Designer in Paris for 15 years in the automotive, railway, electronics, robotics and VR sectors. Since 2017, she is Head of Business Intelligence Services at Laval Virtual.



The first is not virtual or interactive, the second one is. The Museum of Other Realities and the Art Attack in VR-television series are examples of digital art experiences that provide access to worlds where perceptions of time and space are altered. Think of Alice in Wonderland, and imagine that you enter an immersive and interactive new world.

First, you browse through the artworks in a superficial way. If you want to explore more, you can select a 3D work of art, manipulate variables, change the size, enhance light and colours. Dimensions change, gravity disap-

pears. You are experiencing something new, that defies the laws of nature. You are entering a 'deepening abyss', as Guez likes to say.

In order to create new worlds, you need new professions, says Guez. 'Developers, storytellers, virtual museographers, virtual scenographers. These creators need to overcome all sorts of technical problems when you change environments.' We are just at the beginning of using immersive technology in museums. But if done right, the experience can be truly magical.

---

**Marie Leblanc**

Head of Laval Virtual's Business  
Intelligence Department

# Join the IFFR Pro Days

**IFFR.com/Pro**



**50th International Film Festival Rotterdam**  
**27 January – 7 February 2021**

# CENTRE STAGE

TOBY COFFEY, HEAD OF THE NATIONAL THEATRE'S IMMERSIVE STORYTELLING STUDIO, LOOKS FOR 'A SYMBIOTIC RELATIONSHIP BETWEEN TECHNOLOGY AND STORYTELLING'. MOMCHIL ALEXIEV INTERVIEWS HIM ABOUT THE FUTURE OF THE PERFORMING ARTS.

---

How does the National Theatre in London transform performances into immersive storytelling to reach new audiences? 'Some work is independent of the repertoire and some is inextricably linked or provoked by it,' says Toby Coffey, head of the National Theatre's Immersive Storytelling Studio.

For the last five years, the studio has produced a series of immersive experiences. All Kinds of Limbo is an original music piece and performance, created in response to NT's production, Small Island. 'We have created a communal room-scale VR experience where the audience and performers are in the same space together.' Through the use of VR glasses, viewers step into the show, alongside life-size 'holograms' of the musicians.

Madame Kalamazoo does not really happen in virtual reality, but it is still interactive. 'We are not driven by technology. If we can create an immersive story via old-fashioned email, we'll do it.' In the new application that was launched during the pandemic, Madame Kalamazoo is a storyteller who arrived from the Blue Moon at the start of lockdown. She writes funny daily stories for children and sends them to you by email. In the stories, the children are the main characters.

'I think the lockdown has been a catalyst for a lot of digital conversations that have been around for a while,' says Coffey. The National Theatre had to cancel all planned

tours, but the National Theatre at Home platform reached 20 million viewers over the course of four months. 'This shows that the home market is really significant and I think that goes beyond lockdown. This is a much more tangible way to go forward than we considered it to be.'

And the studio has even bigger plans. 'One of the things we will be doing in our next projects is look at how we can better create works that are intended to be consumed across different types of hardware. How can we stage a performance that some people can watch on TV, some in VR, some in MR? Basically, the same performance, but perceived in different ways.'

Any final advice for creators? 'People who are guardians of new work in this area should support a symbiotic relationship between technology and storytelling, rather than one coming after the other, and allow artists time to get used to the technology and create great work.'

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**Momchil Alexiev**



# HACK YOUR WAY INTO THE VR INDUSTRY

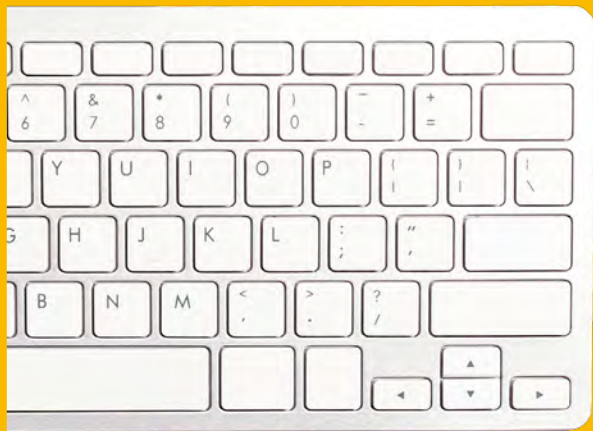
JOANNA POPPER, HP'S GLOBAL HEAD OF VR FOR LOCATION BASED ENTERTAINMENT, SAW VARIOUS POSTS ABOUT HOW HARD IT IS TO GET A JOB IN THE VR INDUSTRY. TO HELP OTHERS ON THEIR JOURNEY, SHE CO-CREATED A SERIES OF ONLINE EVENTS. THIS IS A COMPILATION OF THE BEST ADVICE SHE RECEIVED.

## What are the top skills I need?

Most technical positions require knowing Unity, Unreal, C# or C++. It's beneficial to be familiar with them, even in non-technical roles. Experience as much VR/AR as possible. There are also daily free or low-priced online conferences and seminars you can attend. Follow the hashtag #XRJobs on social media, as questions are answered. It also makes it easier to find people who are working on areas of interest.

## How do I get access to equipment?

VR equipment is an investment. If you're in school, make the most of that access. If your college went virtual, request if lab equipment can be sent home. If you're not in school, ask to borrow equipment from someone who isn't using it. If you have equipment that is collecting dust in the closet, offer it to someone who needs it – pay it forward. Mobile AR experiences are easier to access via your phone.



**What if I don't live in the key clusters for VR, like San Francisco, LA or Seattle?**

Many offices are closed now, so remote opportunities are common. A job may require future relocation, but many positions are remote now. Employers will probably rethink the need for offices as a result of COVID-19. Some CEOs are giving up or downsizing offices and letting employees work from home with about a quarter to a third of employees expect to be working from home in the next two years.

**How do I network when everything is virtual?**

Most online events have networking or opportunities to connect with people. People in XR are relatively approachable via social media so find people in your ideal roles and ask them if they would be willing to do a 10-minute informational interview. Ask for their recommendations, don't ask for a job! Hackathons are also a great way to meet people, improve skill sets and highlight capabilities.

**It sounds like a lot of work to get a job in VR. Is it worth it?**

Yes, it is a lot of work. This is a fast-moving, nascent industry and there is much to learn. There may be financial trade-offs today, but you get a chance to build a new industry. XR will have a large impact on technology and media, the way we live our lives and our worldview. To have a positive influence, we need more people with representative and diverse backgrounds. Bring your own, unique voice.

---

**Joanna Popper**



# FOLLOW THE MONEY

FUNDRAISING IS CRITICAL TO THE SUCCESS OF YOUR START-UP, BUT IT CAN BE A DIFFICULT JOURNEY. DANIEL DOORNINK, CO-FOUNDER OF VRDAYS EUROPE AND FOUNDER OF XRBASE AMSTERDAM, SHARES WHAT HE HAS LEARNED ALONG THE WAY. HE HAS FIRST-HAND EXPERIENCE WITH RAISING CAPITAL FROM HIS TIME IN SILICON VALLEY. HE HAS SET UP A VC FUND STRUCTURE, ORGANISES INVESTOR EVENTS AND IS AN ACTIVE START-UP MENTOR.

The whole process starts with your own expectations of the raise. Set realistic targets, while still being ambitious . The minimum and maximum size often depends on the phase your start-up is in. In my experience, the entire process, from start to finish, always takes longer than expected, so don't try to ask for too much too quickly.

Fundraising requires a wide skill set. Harder (analytical) skills like doing market research, drafting business models, forecasting and reporting. But also

softer (social) skills like networking, pitching and storytelling. Know your own strengths and try to get help from experts and advisors in other areas of expertise.

This may sound obvious, but a good fit between investors and start-up makes a fundraiser successful. As an exercise, try to place yourself in the investor's shoes. An investor or a VC fund tries to make money by allocating capital through implementing their investment strategy or 'thesis', balancing risk versus reward.

Try to understand the investment strategy of your investors, and establish the relevance of your own start-up before pitching. How attractive is your deal to them? A corporate VC (CVC) sets up structural collaborations with external ventures or start-ups to drive mutual growth. Maybe the ideal investor is a CVC instead of a VC, or a mix of both.

It is important to get your story straight before pitching and talking to potential investors. Is the story you tell an appealing and ambitious one? I've noticed that a lot of founders get excited about their product and dedicate most of the time in a pitch or a meeting to talk about it. But it's also important to demonstrate your understanding of the market, know the right timing and show how you plan to make money initially and at later stages.

As a final and more personal tip: don't do it all on your own, but enlist co-founders. Investors often prefer a team over a single founder. And more importantly, you want to share the highs (and lows) of your start-up adventure with someone. It makes the whole experience so much more fun.

---

Daniel Doornink



The Future is already here

 **SOMNIUM SPACE**

**A parallel virtual reality universe** unlike anything seen before. We at **Somnium Space** decided to build **a new experience, a new borderless world, a fully immersive VR experience where you can be anything you imagine.** From a DJ to an architect, from a singer to a digital artist.

**Empowering the whole world,** our global citizen base is already participating in a **strong virtual economy of digital goods and services with a yearly turnover of approx. USD 2 million.**

We believe that **we are at the start of a huge paradigm shift that will create virtual worlds and decentralized economies without any boundaries** and everyone with an internet connection will be able to participate **regardless of their gender, race and political views. A truly free future for humankind.**

 @SomniumSpace

 [disord.gg/somniumspace](https://disord.gg/somniumspace)

[www.somniumspace.com](https://www.somniumspace.com)

# GO WITH THE FLOW

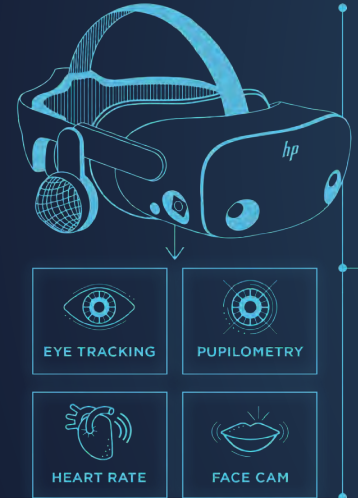
HP'S NEW OMNICEPT PLATFORM IMPROVES VR TRAINING WITH COGNITIVE SCIENCE. HOW MUCH CAN A TRAINEE HANDLE? OMNICEPT HAS THE TOOLS TO MEASURE IT, WRITES ERIKA H. SIEGEL, RESEARCH SCIENTIST AT HP LABS.

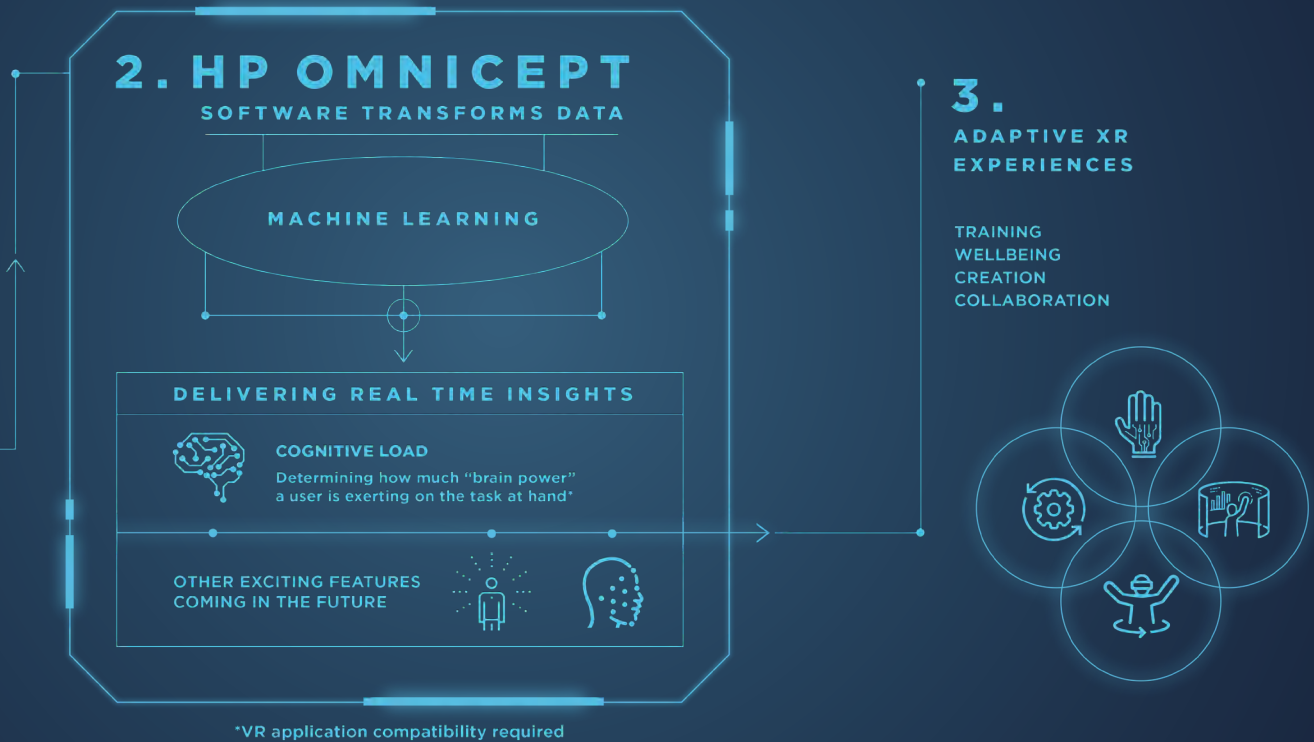
With corporate training budgets flattening or declining, the distribution of the workforce driven by COVID-19, and the increasing demands on individual workers, learning and development professionals must find innovative and effective means to help their people grow. HP Omnicept improves VR training with actionable insights derived from cognitive science.

The platform is a collaboration between HP's software team and scientists at HP labs. Driven by research in neuroscience, psychology and affective computing, HP Omnicept combines physiological sensing with cutting edge machine learning to create better outcomes, particularly in training.

Imagine a pilot training in a VR simulation. The pilot may score well on the scenario, but performance is only one part of the story. How effortful was the training? Did she sail through or struggle to finish? With HP Omnicept integrated into the flight application, the trainer

## 1. HEADSET CAPTURES DATA VIA SENSORS\*





can gain critical insight into the pilot's real-time experience, enabling personalized content and challenges that are within her zone of optimal learning.

The first software release includes a software developer kit for VR developers with an AI inference engine to track mental effort while users complete a VR experience. Research suggests that biometric indicators increase proportionally with mental effort, so HP Omnicept models incorporate information from the heart (PPG, pulse plethysmography), the pupil (pupillometry), looking behaviour (eye tracking), and tracking information from the VR headset and controllers. Additionally, the platform is open, extensible and designed to work with engines like Unity and Unreal. Developers now have the easy-to-use tools to create enhanced VR experiences.

### Mental effort

In scientific terms, the amount of mental effort required to perform a task or learn something new is called cognitive load and has been studied by researchers interested in learning and performance for more than a century. Every person has their own information processing capacity (also called short-term or working memory) and it is fixed, limited and varies from person to person.

Information processing capacity is like the amount of food a person can hold in their mouth at one time. Sure, maybe it is possible to fit 44 marshmallows in your mouth at once, but is it comfortable? Probably not. Is it an optimal way to eat? Definitely not. What about a single sesame seed? Would you even bother? Perhaps, but it would certainly be a waste of energy.



If you can think of information processing capacity the same way, then cognitive load is like the number of marshmallows in your mouth. If you have too much, you can't think. Too little and it's not worth the effort. When cognitive load is very low, performance is often poor because the task is so easy it's boring. When cognitive load is too high, performance is weak because users are mentally overloaded.

When performance and cognitive load are both at optimal levels, users reach a 'Goldilocks zone', also called a 'flow state'. They are engaged, energized and able to complete the task in comfort. Psychological research suggests that optimal cognitive load leads to better information retention, less exhaustion and greater enjoyment of tasks.

Imagine a heavy equipment operator learning how to use a new piece of machinery in a VR simulation. Did he retain the information? Was he engaged? Can he stay focused and operate the equipment safely in an emergency? HP Omnicept unlocks these insights and enables training that is tailored to an individual in a wide range of contexts.

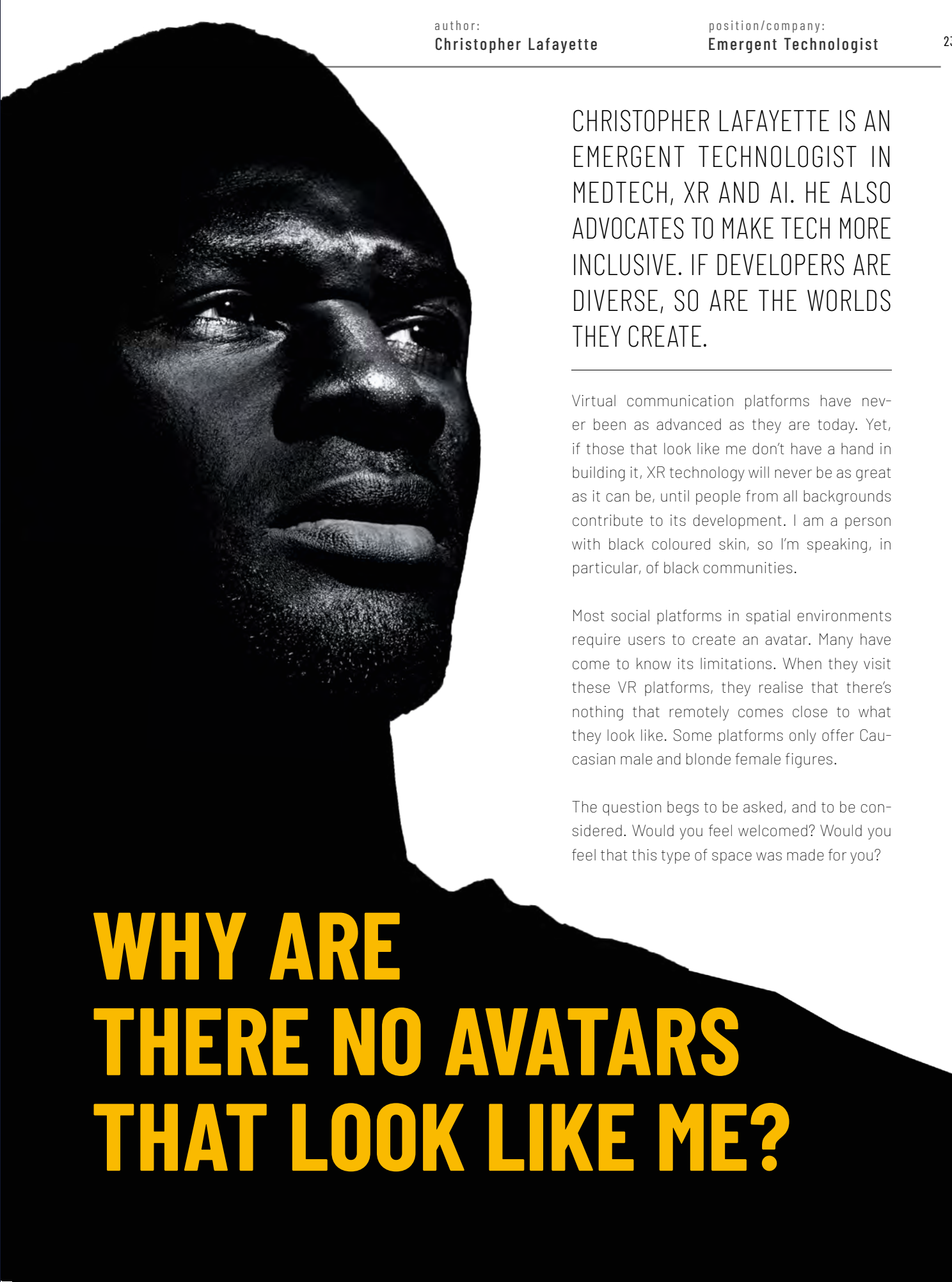
### Become an expert

Cognitive load can also indicate expertise. The mental effort required to perform a task typically decreases with training. With repeated training, cognitive load offers novel insights about a user's learning trajectory. Novices typically experience high cognitive load combined with low performance, because they are acquiring a new skill. As they develop proficiency, their performance improves, but the task still seems hard. As users become experts, they can perform well, without ever feeling overloaded.

HP Omnicept can enable that level of enhanced training and actionable insights. Most people list public speaking as one of their biggest fears. Wouldn't it be great to leverage VR to work through that anxiety? Practicing with an HP Omnicept enabled application means you can zero in on the parts of the speech where you tend to get overwhelmed. With repeated practice, you can track your own trajectory as an expert, giving you the confidence to know when you're ready to take the stage.

**Erika H. Siegel**

Ph.D., Research Scientist at HP Labs



CHRISTOPHER LAFAYETTE IS AN EMERGENT TECHNOLOGIST IN MEDTECH, XR AND AI. HE ALSO ADVOCATES TO MAKE TECH MORE INCLUSIVE. IF DEVELOPERS ARE DIVERSE, SO ARE THE WORLDS THEY CREATE.

Virtual communication platforms have never been as advanced as they are today. Yet, if those that look like me don't have a hand in building it, XR technology will never be as great as it can be, until people from all backgrounds contribute to its development. I am a person with black coloured skin, so I'm speaking, in particular, of black communities.

Most social platforms in spatial environments require users to create an avatar. Many have come to know its limitations. When they visit these VR platforms, they realise that there's nothing that remotely comes close to what they look like. Some platforms only offer Caucasian male and blonde female figures.

The question begs to be asked, and to be considered. Would you feel welcomed? Would you feel that this type of space was made for you?

**WHY ARE  
THERE NO AVATARS  
THAT LOOK LIKE ME?**

The answer is a resounding no. Technology needs more colour, more culture, more stories, people and backgrounds. More women, leaders, drivers and lenses.

Does this take other people's jobs away? No. To make great technology, you need a more refined cultured ecosystem. Ecosystems aren't hardware and software, they are people. The more culture your system has, the stronger it is. We must leave old homogenized monoculture behind us. This starts with product conception and development. Decisions that are made in various stages must transcend implicit and explicit biases.

Diversity is a revenue driver and smart companies will reap the rewards. Diverse companies make fifteen times the revenue of non-diverse enterprises. They enjoy 83 percent better business performance and are

158 percent more likely to understand their customers and users. Also, 47 percent of millennials want to work for diverse companies.

The need for higher equality in XR goes way beyond the notion of doing the right thing. It's essential for future financial stability and success. Think about it. If everyone around you has the same knowledge, skills, worldview and biases, they will inevitably reach the same conclusions and eventually hit a ceiling. Diversity isn't only about race or gender. It's about experiences and perspective.

The reason for diversity must change from 'It's the right thing to do' to 'It's crucial for our revenue and profits'. Wouldn't it be great if this was a non-situation? But this isn't the reality. Technology isn't fun, when only a few people build it.

---

**Christopher Lafayette**

**smart  
health  
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*data for life*

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A woman with long red hair, wearing a bright yellow dress, is walking away from the viewer down a long, perspective-filled tunnel. The tunnel is composed of a series of white, arched openings that recede into the distance. The floor is made of light-colored stone tiles. The lighting is soft and even, creating a sense of depth and continuity. The overall mood is contemplative and forward-looking.

# THE FUTURE IS FEMALE

XR IS A MAN'S WORLD, BUT IT DOESN'T HAVE TO BE. THREE KEY PLAYERS OFFER VALUABLE ADVICE FOR WOMEN AND MINORITIES IN THE INDUSTRY, TO HELP THEM FIND THEIR FOOTING

**ALEXANDRA HUSSENOT IS THE CEO OF IMMERSIONN, A VR COMPANY FOCUSED ON CONTENT DISCOVERY. SHE IS ALSO A MEMBER OF UK5G (DCMS) AND UK LEAD FOR WOMEN IN IMMERSIVE TECHNOLOGIES.**

**What does a diverse team look like and what are the benefits?**

'We're looking for diversity in gender, age and ethnicity, but also in professional and personal backgrounds. For example, some team members are passionate about healthcare or education. Monetisation of our products in these sectors is not obvious to me, but because we have an inclusive management style, we constantly check when opportunities arise. Diversity gives you a wider view of the market.'

**How do you stimulate diversity and inclusion within your company?**

'I lived and worked in seven countries and speak four languages, so I like to think I have acquired a diverse mindset. I also lead Women in Immersive technologies (WiiT) in the UK, which celebrates female founders, leaders and engineers. For a diverse company culture to work, the senior leadership team must be diverse too. Personalities may clash, but as long as team members respect other perspectives and have empathy, these clashes will generate growth and innovation.'

**How do you achieve success in XR as a woman or a minority?**

'Apply and work for companies that are diverse and inclusive. You won't be able to change company culture on your own, so choose wisely who you work for. Once you are hired, don't be afraid to ask questions when you do not understand a concept. We all express our ideas differently and it takes two people to communicate. In a diverse team, not everyone needs to be a rock star coder or speak C++ to join the discussion. Keep asking questions until you are able to contribute.'

**PWC HELPS ORGANISATIONS UNDERSTAND, QUANTIFY THE BENEFITS OF AND IMPLEMENT XR SOLUTIONS. JEREMY DALTON TAKES CARE OF THE XR TEAM, WHICH IS COMPOSED OF CREATIVE TECHNOLOGISTS AND BUSINESS CONSULTANTS.**

**What does a diverse team look like and what are the benefits?**

Our team currently has a 40-60 female/male ratio, 30 percent has an ethnic minority background, and our ages range from 18 to mid-40s. Some of us went to university, others in our team came straight from high school. As a result, everyone in our team brings a different perspective to the table, so that we have a beautiful melting pot of creativity, business sense and technical skills.'

**How do you stimulate diversity and inclusion within your company?**

'The value our XR team places on diversity and inclusion is fuelled by PwC's values as a firm. We partner with organisations such as UKBlackTech, who help us reach a diverse range of candidates. PwC's Women in Technology group launched the Tech She Can Charter in 2018 to increase the number of women working in technology in

the UK. PwC has been voluntarily publishing its ethnicity pay gap data since 2016 and has had a clear data-driven diversity and inclusion action plan in place for a number of years. Recently, during a live webcast for our people discussing Black Lives Matter, our chairman announced a series of measures to turbocharge our efforts on racial equality in the workplace.'

### **How do you achieve success in XR as a woman or a minority?**

'Find an organisation that values you as a person and the high-quality work you can deliver. Once you find that home, you'll be comfortable being yourself at work, your creativity and productivity will improve, and you'll be in the best possible position to build a successful career.'

## **HP IS A TECHNOLOGY COMPANY WITH THE WORLD'S MOST COMPREHENSIVE ENTERPRISE XR PORTFOLIO. JOANNA POPPER LEADS GO-TO-MARKET EFFORTS FOR VIRTUAL REALITY AND LOCATION BASED ENTERTAINMENT INITIATIVES.**

### **What does a diverse team look like and what are the benefits?**

'Data shows that companies with inclusive leadership and work forces score higher on decision-making, stock market returns, financial returns and products. That means it's financially irresponsible to have a team that is not diverse. Compared to other waves of computing, VR/AR is still a young industry, so we have the chance to build

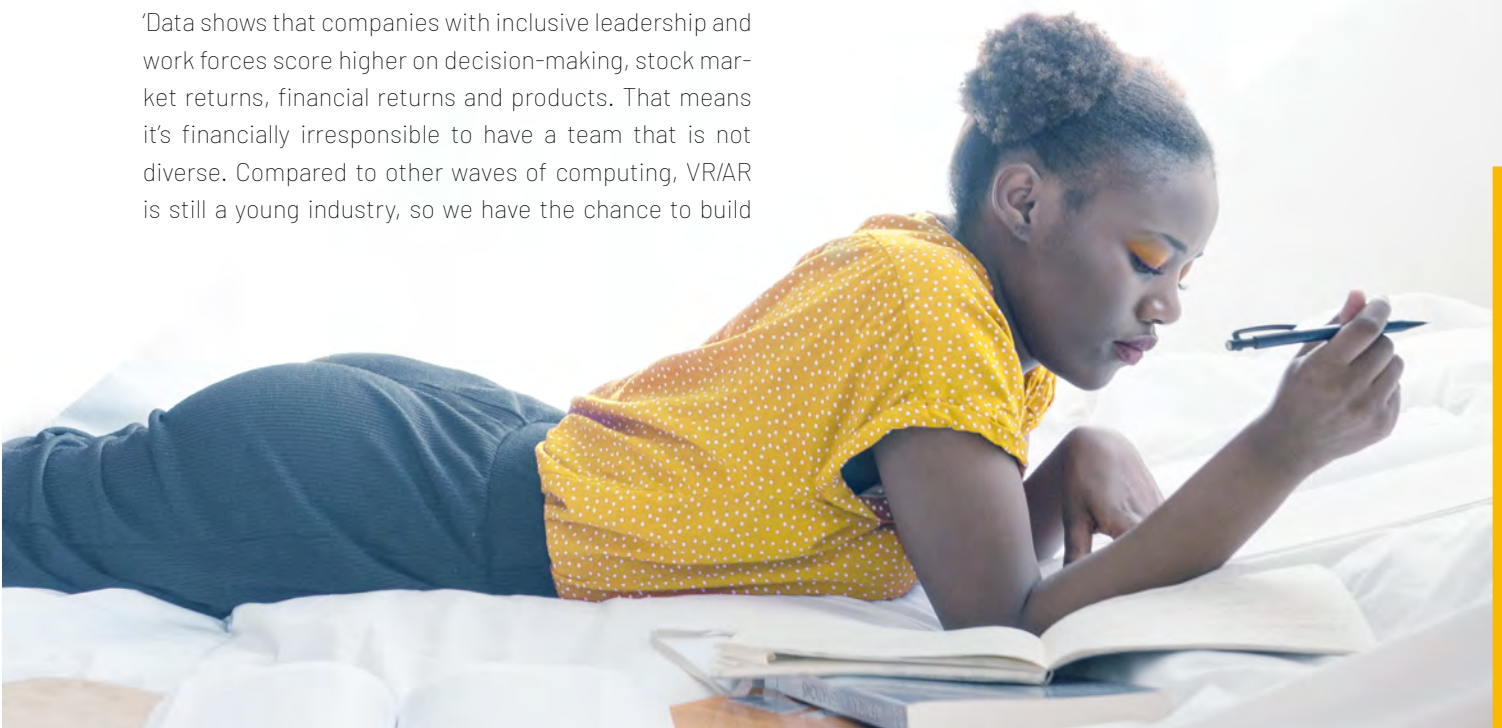
a representative company culture. Since we are creating the future of computing, media and tech, it's crucial that we have a myriad of perspectives, so we build a future that works for all of us, not just a few of us.'

### **How do you stimulate diversity and inclusion within your company?**

'HP has been lauded as a leader in its focus on representation, diversity and inclusion. Our board is the most representative in all of technology. HP was also the first corporation to support Free the Work, an initiative aimed at increasing the percentage of women in advertising and production. We also require our advertising, PR, legal and other agencies to have diverse employees who service our accounts. Recently, HP led several town halls focusing on the Black Lives Matter movement. But there is still much more work to be done.'

### **How do you achieve success in XR as a woman or a minority?**

'Follow your interests and stay curious. Bring your full self and stay confident. Find an organization or culture that values your full self. This is a new industry, so everyone has a lot to learn. We have a great group of women working in XR, so reach out to us for any support you may need.'



# LOVING

CAN PEOPLE FALL IN LOVE WITH VIRTUAL BEINGS? YES, ABSOLUTELY. BUT WILL THEY LOVE US IN THE WAY WE WANT THEM TO? THAT'S THE TRICKY PART, DISCOVERS NICOLAS RIBEYRE, VR/AR BUSINESS INTELLIGENCE MANAGER AT LAVAL VIRTUAL.

Live concerts by the virtual singer Hatsune Miku, a 3D projected hologram on a stage, have attracted crowds of fans. The same goes for Azuma Hikari, a hologram that lives inside a small glass box. Every year, virtual characters become more and more realistic. 'Our goal in designing these characters is to integrate them into people's everyday lives. They would like you to become their friend,' says Minoru Takechi, CEO of Gatebox Inc. Can we feel empathy, friendship and even love in the virtual world? Today's producers want to create 'an emotional relationship with interactive characters,' says Edward Saatchi, co-founder of Fable and executive producer of *Wolves in the Walls*, whose young, virtual protagonist Lucy received an Emmy Award. Pete Billington, co-founder of Fable, says: 'Lucy is able to mirror your hand and eye movements, allowing you to develop your own acuity and sense of touch.' Lucy learns and grows emotionally to become your friend. 'We are going towards the ability to create characters who live alongside us and whom we believe in.'



# A MACHINE

‘People are already able to establish friendly relationships with virtual beings like Alexa of Google Home,’ comments Yuan Yingzi, co-founder of Virtuals.co, a platform dedicated to the virtual world. ‘However, technological limitations do not yet allow a satisfactory level of photorealism. Moreover, a love relationship with a virtual human is not yet socially accepted. Akihiko Kondo, for example, married Hatsune Miku in 2018, which led to worldwide controversy and marginalization of the young groom.’

## YOU CAN LOOK...

VTubers are voice actors behind an animated avatar. Most of them play a character and they’re very popular in Japan. Akihiko Shirai, Director of GREE VR Studio Lab, animates these Vtubers. ‘I compare the technology behind VTubers to the Formula 1 of live entertainment.’ There’s real-time motion capture technology, technology that is able to change voices and generate exaggerated manga-style facial expressions, technology that harnesses the emotions of the viewers. ‘But we must remember that there is a person behind it, it is he who controls the virtual character’, adds Geoffrey Gorisse, teacher and researcher at Arts et Métiers.

We can now meet online or in a virtual world. Some couples meet because they play the same video games. Pit Vinandy, co-founder and producer at Ion Transmedia,

**NICOLAS  
RIBEYRE**

KEDGE Business School, Middlesex University and Aix-en-Provence University's Graduate, Nicolas was Communications Manager for 18 years in Oil & Gaz, Automotive and Health industries. Since 2018, he is Business Intelligence Manager at Laval Virtual

even fell in love in Second Life – several times. ‘You do fall in love with a virtual being, but it’s an expression of the real person behind it. Sometimes the love didn’t persist when we met in real life, sometimes we never even met each other.’ Pit had a married status on Facebook with someone he only met virtually for two years and then met his current wife in Second Life. They are now also married in the real world.

## ...BUT YOU CAN'T TOUCH

Geoffrey Gorisse points out that ‘one can be attracted to a virtual being, but it’s difficult to create a fair, bilateral relationship in a man-machine relationship. AI will only create the illusion of bilaterality, but will fail the relationship in the long run.’ So, can we even talk about love with a virtual being? ‘Virtual agents don’t have natural reactions yet, and feelings are stronger in real life, more intense. You can’t touch, kiss or cuddle with a virtual agent’, says Anne-Sophie Milcent of Arts et Métiers, who wrote a thesis on expressive virtual agents and empathy.

In the game *Detroit: Become Human* by Quantic Dream on PS4, the virtual character addresses us, she asks us if we agree to be friends. But will we have a long-term relationship with a virtual agent? ‘Empathy, feelings, certainly, but even if we develop physical attraction and these feelings become strong, the question will remain as to how to have a relationship of trust in a man-machine relationship,’ concludes Milcent.

In the hit movie *Her*, the femme fatale is a sultry voice generated by an artificial intelligence. (It’s Scarlett Johansson by the way.) She has no body, but a very bright mind. She listens to the lonely, depressed Theodore, laughs with him, even loves him. But the person he wants her to be ultimately doesn’t exist.

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**Nicolas Ribeyre**

# VR IS USELESS WITHOUT EYEBALLS

VRTL IS AN ONLINE LEARNING PLATFORM FOR THE IMMERSIVE INDUSTRY. THEY'RE ON THE FRONT LINES OF VR FESTIVALS AND EVENTS. IT'S HOW THEY FIND TOP-TIER CREATORS AND PROFESSIONALS FOR THEIR STORIES, MODULES AND MASTER CLASSES. EDITOR-IN-CHIEF JUSTINE HARCOURT DE TOURVILLE EXPLAINS WHY VR MAKERS SHOULD BREAK OUT OF VR CIRCLES.

Think of how makers are always chasing grants, festival entries or content distribution: VR people talk to VR people. But if makers want to trade their niche audience for wide viewership, a 360° audience is as important as the 360° cameras. VR makers have to actively invest in building an audience outside the immersive world. In actual reality.

For Raphael Pavón (Creator and Producer at Atlas V, Jaunt and Future Lighthouse), immersive content starts by taking an idea and then 'walking the user journey'. The maker physically choreographs the experience in order to map the viewer's response. It's a smart move. You discover where you might lose your viewer. Or see where the headset cables tug. That way, you will save costly edits and re-shoots. It's nearly impossible to build an audience if you lack a solid viewer experience.

## DESTINATION MEETS DISTRIBUTION

Liz Rosenthal (Power to the Pixel and Immersive Programmer for the Venice International Film Festival) has spoken extensively about first considering the range of distribution outlets, including planetariums, arcades, museums and galleries, as well as the more obvious platforms and content aggregators.

Since you 'walked in your viewer's shoes', you can choose the right venue early in the creative process. It allows you to match your work with the correct distribution and monetisation model, e.g. not putting Occupied VR's creepy piece about a psychopath (The Golden Glove) in a serene art museum. Figuring out the best location to reach your audience shapes the essential money-making portion



of VR. It filters the right players to negotiate revenue share, platform exclusivity and distribution deals.

These audience-oriented decisions affect production at all stages. A compelling project is easier to sell not only to the initial funders (including friends and family), but also to agents and distributors after post. This is when it pays to step out of VR circles and borrow from mainstream marketing.

## START WITH A BUZZ

There was a reason Baobab Studios chose Ali Wong for *Bonfire* or John Legend and Oprah for *Crow: The Legend*, as opposed to unfamiliar actors. If you are able to sign a big name to your production, from acting to directing, the resulting interest will help you get exposure, including with licensing and distribution. Big names even helped *Spheres* land its jaw-dropping seven-figure deal. Start with local talent and recognition, and leverage initial success. That's how *4Feet: Blind Date* began, an Argentinian cinematic piece on disability and romance. Producer Ezequiel Lenardon saw writer Rosario Perazolo Masjoan at a *TedxCórdoba* event. The resulting work (directed by María Belén Poncio) sailed through the film festival circuit, ultimately winning the best 360° narrative award at SXSW in 2019.

## GROWTH HACKING YOUR AUDIENCE

Don't be tempted to skimp on your website budget. You need a web presence that dazzles visually with sharp, nicely written text. It's essential because it showcases your work to the press and bloggers, especially those outside the VR landscape, but relevant to your project's topic.

It may be tedious, but it takes zero dollars to build a press list and email a short note with a link to your website. Twitter is an excellent resource to find journalists that cover themes you are addressing. Focus on developing an affinity with the writer through thoughtful dialogue, before you dive into a coverage request.

Next, you can hold your own press event in a local venue with a few borrowed headsets. It can be anywhere from a coffee shop to an immersive arcade. A release party with a curated guest list (granted, more challenging in times of COVID-19) is a way to organically grow your reach. Positive reviews can only help you on your quest to secure a licensing agent.

Often underestimated are local festivals and events where you can engage walk-in traffic. A booth where you show an immersive documentary on Palestinian rights may not be the right fit for, let's say, Gilroy, California's garlic festival, but it might work at a cross-cultural community fair. Bonus: you connect with a large swath of folks unfamiliar with VR.

Invest in highly targeted social media ads to attract more viewers who are interested in your project's topic. Interaction with the public gives you clues into monetisation opportunities. Are you seeing any product crossover potential, like T-shirts or other swag? Maybe possible advertisers or sponsors? You can always ask the public for crowdfunding.

## WIN THE EYES, WIN THE WAR

Since creators are competing for attention, an 'If you make it, they will come' approach to VR is fatal. Start by thinking from the audience's perspective in the beginning. Select the venue up front. Actively budget time and money to gain public exposure (and influence distribution). VR only wins when artistry and storytelling are equally matched with a focus on what really matters: putting more eyeballs into headsets.

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**Justine  
Harcourt de Tourville**



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# EUROVR IS DEAD, LONG LIVE EUROXR

EUROXR AIMS TO UNITE XR PROFESSIONALS IN EUROPE, TO SHARE KNOWLEDGE AND EXPERIENCES. TO KEEP UP WITH THE EVER-CHANGING INDUSTRY, THE ORGANIZATION RECENTLY REBRANDED AND REGROUPED, WRITES COMMUNICATION MANAGER BEATRICE PALACCO.

The global extended reality (XR) market is rapidly growing, reaching an estimated 393 billion dollars by 2025. Most companies are already seeing major benefits by implementing XR applications in their everyday business. EuroXR is an umbrella organization that brings together individuals, small-to-medium enterprises, large companies, as well as research institutions, universities and laboratories. EuroXR has been operating on the European continent for more than ten years, providing a solid network for everyone who's interested in interactive technology (VR, AR and/or MR), which makes it one of the most important pillars of immersive technologies in Europe.

Founded in 2010 and continuing the work of FP6 Network of Excellence INTUITION (2004 – 2008), EuroXR's wants to be a beacon for the international XR community, offering professionals many opportunities to meet, via conferences and VR/AR events, to stimulate collaboration in European and international projects. EuroXR also promotes new research and technological developments, and uses their large platform to share the latest news in the XR industry. To keep up with the latest market trends, EuroXR also decided to rename and rebrand the organization. Many of you may have heard of EuroVR, but our community will continue under the new name EuroXR.

EuroXR has a monthly newsletter, with testimonials and updates from our members, but also from external parties. Members can now also create special interest groups, to have a space where professionals can ask for (or provide) solutions to problems in their particular field of interest. Despite the changes and updates, EuroXR cherishes the same core values: dedication, inclusion, active cooperation and sharing knowledge. The aim will always be to unite the academic world, research and private companies, connecting professionals and supporting them on their endeavours.

The 17th annual conference will be held at UPV – LaBL ENI, in Valencia, from November 25th to 27th 2020. EuroVR 2020 will bring together key players in research, industry and commerce, to exchange knowledge, new results and applications. You can also request a guided tour from the most innovative companies in XR and even enjoy live demonstrations of their products. Participants are also granted online access to the scientific papers presented at the conference. For more information about EuroXR and the upcoming convention, please visit: [euroxr-association.org](http://euroxr-association.org).

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**Beatrice Palacco**

# CAN YOU SUE A MACHINE?

WHO IS TO BLAME WHEN ARTIFICIAL INTELLIGENCE SYSTEMS CAUSE TROUBLE? SIMON PORTMAN, MANAGING ASSOCIATE AT MARKS & CLERK LAW LLP, TRIES TO SHED SOME LIGHT ON A HIGHLY COMPLEX DISCUSSION.

Artificial intelligence (AI) covers a broad range of different technical areas, including machine learning, neural networks, computer vision, speech and audio recognition, natural language processing and emotion recognition. Generally, this involves the use of opaque computational models to make decisions or identify patterns. These models are opaque, not by design, but often by necessity because of the amount and complexity of the data used. This opacity gives rise to key legal and regulatory challenges.

The major legal issues if damage occurs, revolve around the causal relationship between a defendant's conduct and the end effect. Within the realm of AI, one is faced with the question of whether the capacity for machines to learn and make independent decisions also means that they can incur liability and have fault laid at their door. Typically, the law seeks compensation from the party at fault (be it an individual, company or other entity), but how does one claim compensation from a program or a machine?

For example, a patient is misdiagnosed because of a glitch in an AI cancer diagnosis tool. Who is then responsible? Is it the treating doctor, who might then be clinically negligent? Or is it the manufacturer or programmer of the AI system, in which case the principles of product liability kick in? Or is it the software of the AI itself? Similar problems could arise if flawed trading software makes investors bankrupt or autonomous vehicles collide.



## AI INVENTORS

AI systems have the ability to make a choice between alternatives in order to achieve a specific outcome. This means that they have the capacity to create in their own right and do not have to be dependent upon a human writing code with a predisposed outcome in mind. Instead, AI systems are 'taught' via algorithms how to create an original outcome by analysing large data sets. This enables them, for example, to use predictive features to risk profile patients, foresee market trends and guide autonomous vehicles round obstacles.

This also means that they could generate patentable inventions. With regard to UK patent law, the UK Intellectual Property Office (UKIPO) specified in its Formalities Manual that an 'AI Inventor' is not acceptable as an inventor 'as this does not identify a person which is required by law'. It continues to clarify that the consequence of failing to supply information of the person or corporate entity will result in the withdrawal of the patent application under section 13(2) of the Patents Act 1977.

In UK law, it is therefore crucial to contractually specify which natural and/or legal person(s) own the generated works created by AI systems, in order to avoid potential issues under UK IP ownership laws. AI inventors are not accepted. This approach has been replicated in the patent offices in other countries. Whether this approach changes, as time goes on and they become more common, remains to be seen.

## DATA STORAGE

Greater reliance on AI also gives rise to privacy concerns. For example, with the Data Protection Act 2018, implementing the General Data Protection Regulation (GDPR), the UK has seen the implementation of greater protection for personal data. The GDPR requires a legal basis for the processing of any personal data in conjunction with the relevant data controller providing transparent information on what is being done. Considering the opacity of many AI systems, it is hard to see how data controllers who are responsible for vast amounts of data being utilised by AI systems can adhere to this.

Additionally, the GDPR grants an individual the rights not to be subject to decisions based solely upon automated

processing (e.g. profiling) which results in legal or other effects concerning that individual, such as a credit rating or risk assessment for insurance purposes. When we consider where many AI systems are being utilised – within banking, finance, healthcare and insurance sectors – we can see how the storage and handling of personal data will increasingly fall short of regulatory safeguards. Anybody hoping to utilise AI systems will need to decide whether there are avenues available to help address data protection concerns. They need addressing in privacy notices and data transfer agreements.

## INCREASING CONCERNS

The problem is further complicated by the fact that other jurisdictions have other privacy regimes. The EU no longer views the US one as adequate and there is increasing concern that in China privacy is secondary to State needs. But most data transfers cross jurisdictional boundaries. An individual afforded protection in

their own country may therefore lose it as soon as their data goes elsewhere.

The benefits of AI result in a trade off in that there may be a loss of control and transparency. Decisions based by AI may get made more quickly and may even be correct more often, but when they are flawed or result in a bad outcome it will be much more difficult to pinpoint where things went wrong. If we wish to benefit from AI – and the genie is truly out of the bottle – we may have no choice but to mitigate the downside with regulation and then live with it.

### SIMON PORTMAN

Simon specialises as a commercial contract lawyer for technology companies. He heads the Marks & Clerk XR Team and also works for clients in the electronics, AI, bioscience, software and creative industries

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# PAIN RELIEF IN VIRTUAL REALITY

ROBERT FINE IS THE FOUNDER AND EXECUTIVE DIRECTOR OF THE INTERNATIONAL VIRTUAL REALITY AND HEALTHCARE ASSOCIATION. HE EXPLAINS HOW VIRTUAL REALITY CAN BE USED TO ALLEVIATE PAIN AND REDUCE THE USE OF OPIOIDS.

**ROBERT  
FINE**

Executive Director and Founder of IVRHA (International Virtual Reality and Healthcare Association). He has 25 years of experience across engineering, environmental science and publishing

Let me start by saying something controversial. The pandemic has been good for virtual reality and healthcare. This isn't to minimize the enormous human and financial toll that this crisis has impinged and continues to inflict upon our society, but just as the situation has benefited companies supporting those working from home, like Zoom and Amazon, virtual reality is back in the spotlight, because it allows us to collaborate remotely, which has potential use in telemedicine.

The notion of applying virtual reality (VR) to healthcare isn't new. Researchers have been focused on this for more than thirty years. One of the earlier applications that is getting a great deal of renewed attention is using virtual reality as a means to reduce both acute and chronic pain. There are no chemicals or wonder pills to inject or swallow. Researchers are simply leveraging the innate abilities of the human brain to alleviate the very real and perceived pain that a particular patient is enduring.

Changing the dressings of a burn wound can be excruciatingly painful, and oftentimes, opioid analgesics alone aren't helpful. Researchers had patients play a VR game called SpiderWorld. The immersive environment that VR is able to provide over other forms of distraction like console games or watching a movie helped to distract the patient during the dressing procedure, reducing the awareness and impact of the pain the procedure was causing. The results were published in a paper by Hunter Hoffman and colleagues: Virtual reality as an adjunctive pain control during burn wound care in adolescent patients(2000).

## PATIENCE AND DEDICATION

Much of the basic research groundwork has been completed, but on systems that cost tens of thousands of dollars, restricted to research labs. But with VR's renaissance in the last five years, a significant new computing platform could potentially reach and affect millions.

Technology doesn't go mainstream overnight. It's a process that can take years. But it's easy to identify early on. When the first iPhone came out thirteen years ago, many people knew this was something different – and game changing. But it was only last year that the iPhone surpassed 50 percent of the total smartphone market.

It's the same with virtual reality. When Oculus launched their Kickstarter in 2012, and when backers received their units a year later, everyone knew this was something special. It's why Facebook paid \$2 billion to acquire Oculus in 2014. But it has taken more than five years to produce a headset that caught the attention of the general public, in last year's holiday season. So, it can take time to tempt the masses.

*Want to keep up with the evolving research on virtual reality and pain management? Follow the Pain Studies Lab at Simon Fraser University,*

*via: [painstudieslab.com](http://painstudieslab.com)*

## HIGHLY ADDICTIVE

Which brings us back to virtual reality and healthcare, and the impact it will have on pain management. The opioid crisis did not happen overnight either. It grew over a fifteen-year period. Since 2002, the number of reported deaths grew 22-fold to over 72,000 Americans dying of a drug overdose (both illicit and prescribed) in 2017. The United States only declared it as a Public Health Emergency in October of 2017.

Numerous researchers over the last five years have been studying whether virtual reality can be used during medical procedures in lieu of, or with significantly reduced opioid usage. The results from a study done in 2018 seem promising.

'Immersive Virtual Reality (IVR) significantly reduced the amount of opioid medication administered during painful wound care procedures when IVR was compared with no IVR', concluded McSherry and colleagues in their paper Randomized, crossover study of immersive virtual reality to decrease opioid use during painful wound care proce-

dures in adults (2018). 'Since pain scores were similar before and after the wound procedures with IVR and without IVR, the 39 percent reduction in opioid medication during IVR supports its use as a pain distraction therapy during painful procedures.'

So where are we headed? The issue isn't whether opioids should or should not be used in treating pain. The problem is that opioids are highly addictive. If the use of VR helps to minimize the dosage of opioids required to treat pain, then you're reducing the risk of a patient abusing and/or becoming addicted to the opioids.

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**Robert Fine**

Executive Director, IVRHA  
Intelligence Department

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# HIGH FIVING IN VIRTUAL REALITY

THE AGENTS OF EXP REALTY HAVE A VERY SPECIAL PLACE TO SOCIALISE AND COLLABORATE. IT'S A VIRTUAL WORLD CALLED VIRBELA, WHERE AVATARS CAN EVEN MEET ON A SPEEDBOAT, WRITES ANITA BRUZZESE.

How can employees work from home and still be collaborative, productive and creative? eXp Realty solved that problem years ago when it became a remote real estate brokerage. The company was born out of economic necessity in 2009 and is currently reporting more than 8 million dollars in profits. Other enterprises can learn from this, especially when it comes to harnessing the power and innovation of virtual reality.

eXp Realty uses VirBELA, an immersive technology platform for businesses, events and education. Its cloud-based environment provides a virtual world where eXp agents receive training, can attend meetings, chat with human resources, tech or payroll employees, or just brainstorm with colleagues. 'When eXp first started, we knew that we needed to build a community if it was going to be successful,' says eXp founder and CEO Glenn Sanford. 'It turned out that VirBELA solved the whole problem.'

While not exactly a playground, VirBELA does resemble the popular video game Fortnite in that it lets users create unique avatars. Options include various skin tones, hair and clothing, including hats and sunglasses. These avatars can move freely to different spaces, attend a large meeting or meet for a private chat with a colleague. The virtual world even offers some fun elements, like holding a meeting on a speedboat, and lets avatars interact with one another by giving high fives, doing a flip or dancing.

Due to the pandemic, many people are starting to experience Zoom fatigue, the mental and emotional exhaustion of always being 'on'. This was something that Sanford and his team experienced years ago. By using VirBELA, which eXp acquired in 2018, tasks get completed more easily. 'By using the avatars, you're engaged with others but it's not as taxing,' Sanford says. 'You can share the environment with others, maybe do something fun like go out on a soccer field – but you are still able to get meaningful work done.'

eXp Realty currently has over 30,000 agents in the U.S., Canada and the United Kingdom. Sanford says it's not unusual for new agents to be hesitant about entering a virtual world, but they are quickly won over, once they start using it more often and see how it helps them be more connected. 'They can't believe how good it is,' Sanford says. 'People are really engaged.'

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**Anita Bruzzese**

# DOCTOR XR, CAN YOU HELP ME?

ALBERT 'SKIP' RIZZO DIRECTS THE MEDVR LAB AT THE UNIVERSITY OF SOUTHERN CALIFORNIA INSTITUTE FOR CREATIVE TECHNOLOGIES AND CONDUCTS RESEARCH ON THE DESIGN AND DEVELOPMENT OF VR SYSTEMS FOR CLINICAL POPULATIONS. HOW CAN XR BE USED TO IMPROVE PHYSICAL AND MENTAL HEALTH DURING A GLOBAL PANDEMIC?

In addition to the tragic effect of COVID-19 on the medical health of the world population, its ominous presence is likely to impact our mental health. It is easy to imagine how social isolation can induce stress, loneliness and social tension. There are also real concerns that the corona experience will have a lasting psychological impact on some people, long after the curve has flattened and a vaccination has been successfully developed.

## STANDALONE

The urgency to address COVID-19-related mental health challenges comes at a time when clinical XR has evolved from aspirational vision to pragmatic reality. As the costs and complexity for developing health and wellness XR applications have gone down, the sheer capacity of the technology has concomitantly gone up. Exciting clinical opportunities are further enabled with the recent developments in 'standalone' VR headsets (e.g. Oculus Quest, Pico Neo, Vive Focus).

At the same time, simulation-based digital XR formats – virtual, augmented and mixed reality – offer new capabilities for health and wellness that simply did not exist in the 20th century. Over the last 25 years, researchers and clinicians have used XR (primarily VR) as a tool to advance clinical assessment, intervention and scientific research. XR is well-matched to address the challenges for providing effective clinical strategies for mental health, rehabilitation and general medical purposes.

Such VR display systems don't even require a tethered computer, with all the graphic and interaction processing taking place onboard the device. 5G cloud-computing promises to advance this capability by offloading much of the real time simulation processing to remote servers that will offer up large libraries of clinical VR scenarios designed to meet the needs of diverse clinical populations.

## TELETHERAPY

One immediate impact of the pandemic can be seen in the accelerated interest in using clinical XR tools for treatment of mental health conditions, like depression, PTSD, addiction and anxiety disorders. This is similar to the increased credibility and application of teletherapy as an effective and low risk form of engagement between patients and providers. It is now considered to be a viable healthcare option that will likely endure beyond the current crisis.

Moreover, low-cost standalone VR platforms improve user access to mental health and wellness applications at home. This can be seen in the adoption of home-based XR to promote meditation, mindfulness and relaxation. XR can provide users the opportunity to be psychologically transported to highly realistic and sometimes hyper-idyllic settings, that encourage engagement with stress-reducing activities. This is important, since people experiencing high stress or anxiety may not have the patience to practice these coping strategies. For example, learning to achieve a 'mindful' state typically requires multiple sessions before the user perceives a change in their mental and emotional experience.

## OTHERWORLDLY

It helps to design an XR context that appeals to and engages users. Think of lush terrestrial spaces and surreal fantasy worlds. When users are removed from their everyday surroundings, they may be more likely to achieve the benefits of a calm state. These apps may be especially appealing to users who have been isolated in their home for extended periods during the COVID-19 crisis.

The market already provides many options for users wanting to explore these approaches, e.g. AppliedVR, Tripp, Magic Horizons, Meta-Medical and Guided Meditation VR. Some also integrate binaural beat audio stimulation, transcranial magnetic stimulation and varied forms of bio/neurofeedback integration, believed to enhance relaxing brain states.

## KEEP MOVING

Alternatively, VR experiences that serve to motivate exercise may provide isolated users with a fun way to keep active, with game-based workout experiences in an immersive and interactive context. Beat Saber is one of the most



popular applications in this genre, but one of my favourites is Jam Studio VR. JSVR lets users play a myriad of virtual instruments via body movement, translating users' frenetic activity into surprising good sounding music.

While there is no magic cure for the stressful experiences that have emerged from the COVID-19 crisis, XR may provide some relief via meditative, physically activating and emotionally evocative experiences. XR can also enhance the treatment of severe clinical conditions, supervised by well-trained professionals. One thing is for sure, exciting new developments loom on the horizon of future mental healthcare.



## **ALBERT "SKIP" RIZZO, PH.D.**

Skip Rizzo directs the MedVR Lab at the USC Institute for Creative Technologies and conducts research on the design, development, and evaluation of VR systems for healthy and clinical populations.

**STUDIO KROMHOUT**

In onze locatie aan het Amsterdamse IJ hebben we een professionele studio ingericht die de mogelijkheid geeft een online event te faciliteren. De Kromhouthal heeft de flexibiliteit uit te breiden naar hybride met verschillende breakout ruimtes. Studio Kromhout staat onder begeleiding van ervaren technici en professionals op het gebied van online en interactieve content. De afgelopen jaren hebben we als team ervaring opgedaan in online events, ervaringen die we graag met jullie delen.

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# DATA DRIVEN VR SIMULATION TRAINING: REDUCING RISK

Last year, the Fortune 500 spent \$100 Billion on training and safety and yet the majority of those companies suffered a death or serious injury in the previous 18 months. So why is that? The majority of companies are using traditional methods such as lectures to deliver training, even though we know that this is ineffective and inefficient.

When people train using our HEAT data driven VR simulation platform, we gather approximately 100k data points per minute. This is demographic data, location data and tasks and metrics data. So that translates as we are measuring who you are, where you are and what you are doing. We are also currently working on integrating physiological sensors so that we can also measure how you're feeling. Ultimately, this data helps to improve the effectiveness of training, measure performance and ensure jobs-skills fit. We are seeing outstanding results that are correlating with other independent reports on the efficacy of VR simulation training. It is leading to faster, more effective learning, more engaged learning and, when done at scale, more efficient learning (Casestudy: <https://vraisimulation.com/iagcargo/>)

For people who work in risky or remote operational environments, such as front line military personnel, offshore wind technicians, or even workers in manufacturing settings, there is a need to train, prepare for and mitigate risk. Traditional e-learning tools can not prepare someone to climb a high voltage electricity pylon in a storm, or fix a blade on a 100m high wind turbine 100km offshore in the North Sea.

Where can business leaders look to for guidance on how to prepare their employees in this unpredictable world? We believe the answer is military simulation training. The military have been using simulation training for decades as a way to replicate risky, remote and 'difficult to replicate' scenarios.

Military commanders know that they have a 'duty of care' to train and prepare their troops appropriately as anything else would be a dereliction of duty.

This duty of care now also extends to business executives to ensure their employees are prepared remotely. VR simulation training enables this and the data generated will start to unlock insights that were previously unknowable. We know from working with large customers such as IAG in Heathrow Airport, the United Nations in Somalia and leading European militaries, that data driven VR simulation training can transform how you train. Data driven VR simulation training reduces risk, improves training outcomes and provides a scalable solution for how to train your people remotely without the need for downtime on operational equipment, scarce instructors or expensive travel.





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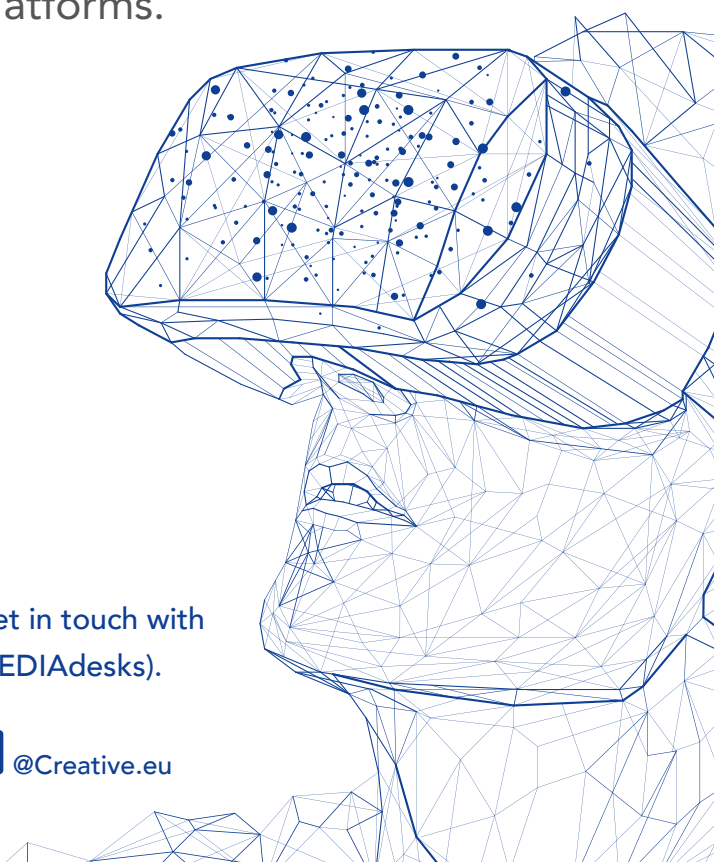
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# AROUND THE WORLD IN 360 DEGREES

THE COVID-19 PANDEMIC FORCES GOVERNMENTS TO IMPOSE SEVERE RESTRICTIONS ON TRAVEL. SINCE WE CAN'T ROAM THE WORLD LIKE WE USED TO, VR COMES TO THE RESCUE. PETER GRAHAM, SENIOR STAFF WRITER AT VRFOCUS, PICKS THE BEST APPS TO EXPAND OUR HORIZONS.

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## GOOGLE EARTH VR

The go-to travel app if you have a PC-based VR headset. Google Earth VR should be your first choice, because it's free. Spin the world and choose a destination, with plenty of locations in glorious 3D, step atop the Eiffel Tower or head down the Amazon River.

## WANDER

If you have an Oculus Quest, then Wander is the next best thing to Google Earth VR. Not quite as polished, Wander is still a good choice when you want to leave those four walls behind and explore far-flung destinations like the highlands of Scotland or the bustling streets of Tokyo.

## ECOSPHERE

Travel the world and learn about the varied ecosystems teaming with wildlife, getting up close to orangutans, manta rays and elephants. Created in partnership with the World Wide Fund for Nature (WWF), ecosphere is a collection of immersive 180-degree videos, stretching from the jungles of Borneo to the coral reefs of Raja Ampat. Only for Oculus Quest.

## EVEREST VR

Love adventure? Why not head up the world's tallest mountain in Everest VR. Take in impressive views across the Himalayas and learn about mankind's history ascending this colossus of nature, whilst dealing with dangers like the cold and lack of oxygen.

## TITANS OF SPACE PLUS

There are plenty of ways to explore our planet, but what about further afield? Titans of Space PLUS takes you beyond the safe confines of our atmosphere and into the dark void. Take a guided tour, learn about our solar system or take a zero-gravity spacewalk.

## BLUEPLANET VR

Another curated collection similar to ecosphere, Blueplanet VR features over forty 360-degree experiences from culturally significant locations worldwide. Explore the outside of Borobudur Temple in Indonesia and stand in the middle of Bears Ears National Monument in the United States.

## WAR REMAINS

Slightly different from the rest of this list, War Remains is a sombre historical experience taking you to the front line of World War 1. Narrated by Hardcore History's Dan Carlin, learn about this terrible conflict and the horrors soldiers faced in the trenches of Europe, where artillery shells constantly rained down and deadly mustard gas covered the battlefield.

# Unbound is dé 'one-stop-shop' voor XR professionals

Het meest brede, actuele en **volledige assortiment** in **VR/MR/AR hardware**, randapparatuur, accessoires en aanverwante diensten in een **overzichtelijke webshop**, met extreem **kundige medewerkers** en **razendsnelle levering** tegen een **competitieve prijs**.

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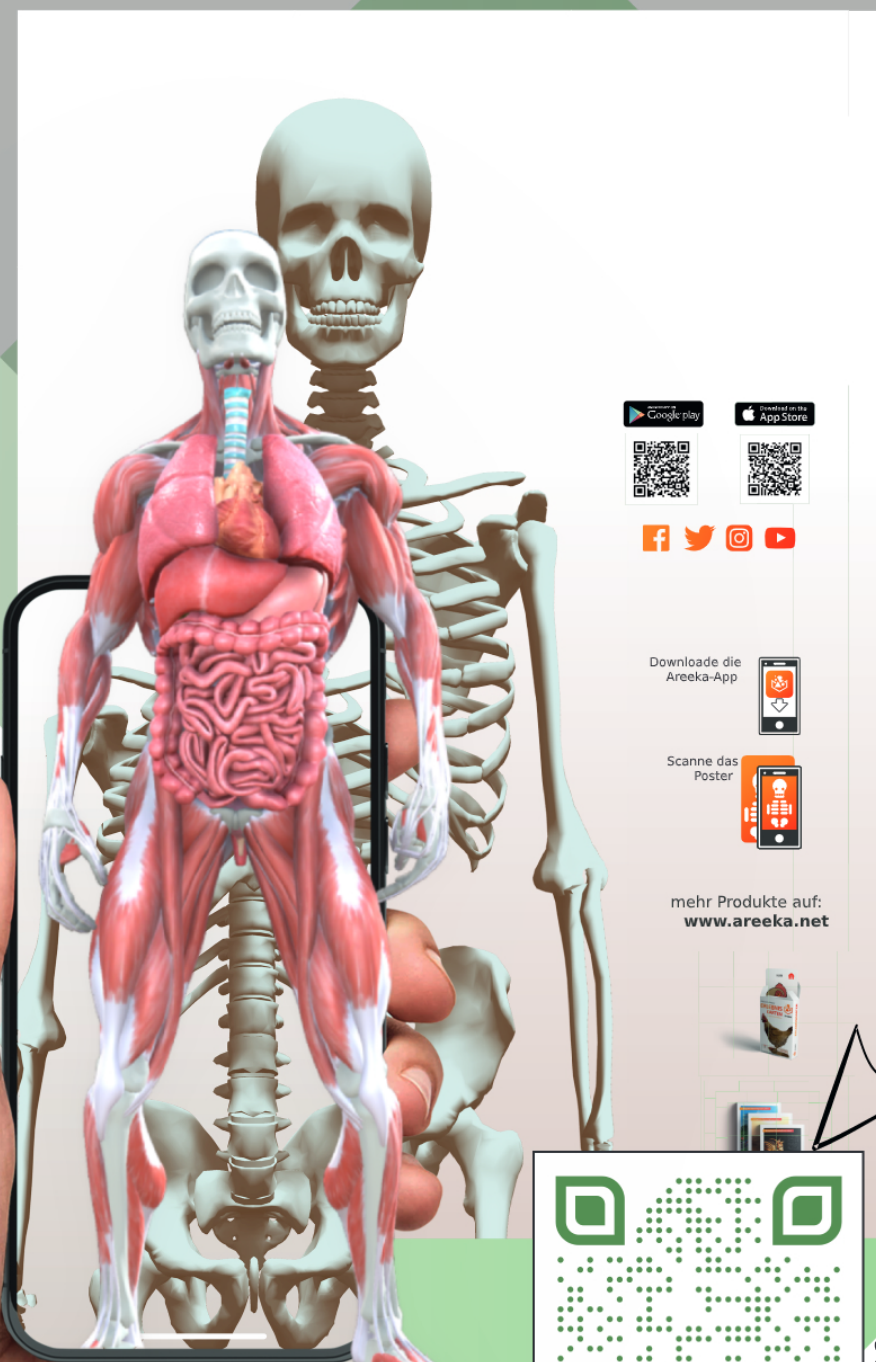
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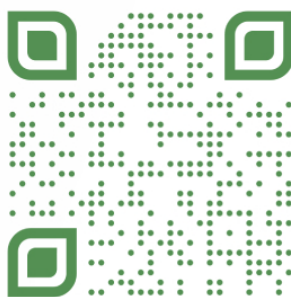
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**Areeka** is the Education brand under Amlogy that revolutionises the sector by developing immersive tools and promoting interactive learning. The goal is not to replace traditional learning but to complement it with digital methods. Areeka believes in community and has an ecosystem which includes a mobile app, working with Partner Schools and Influencers, and has a variety of content that includes theme booklets, interactive cards and posters, and plenty more materials to enhance the learning process and bring back the fun and engagement to the classrooms. [www.areeka.net](http://www.areeka.net)

**WEAR** is the environmentally sustainable fashion brand of Amlogy that combines cutting-edge WebAR technology with high quality fashion. WEAR is a young fashion label bringing life, character and interaction to clothing apparel and creating communities in the process. Currently you can access a variety of t-shirts and socks, with an even wider range of products lined up including caps and fabric bags. Every garment comes with catchy unique print and interactive animations on specific themes.

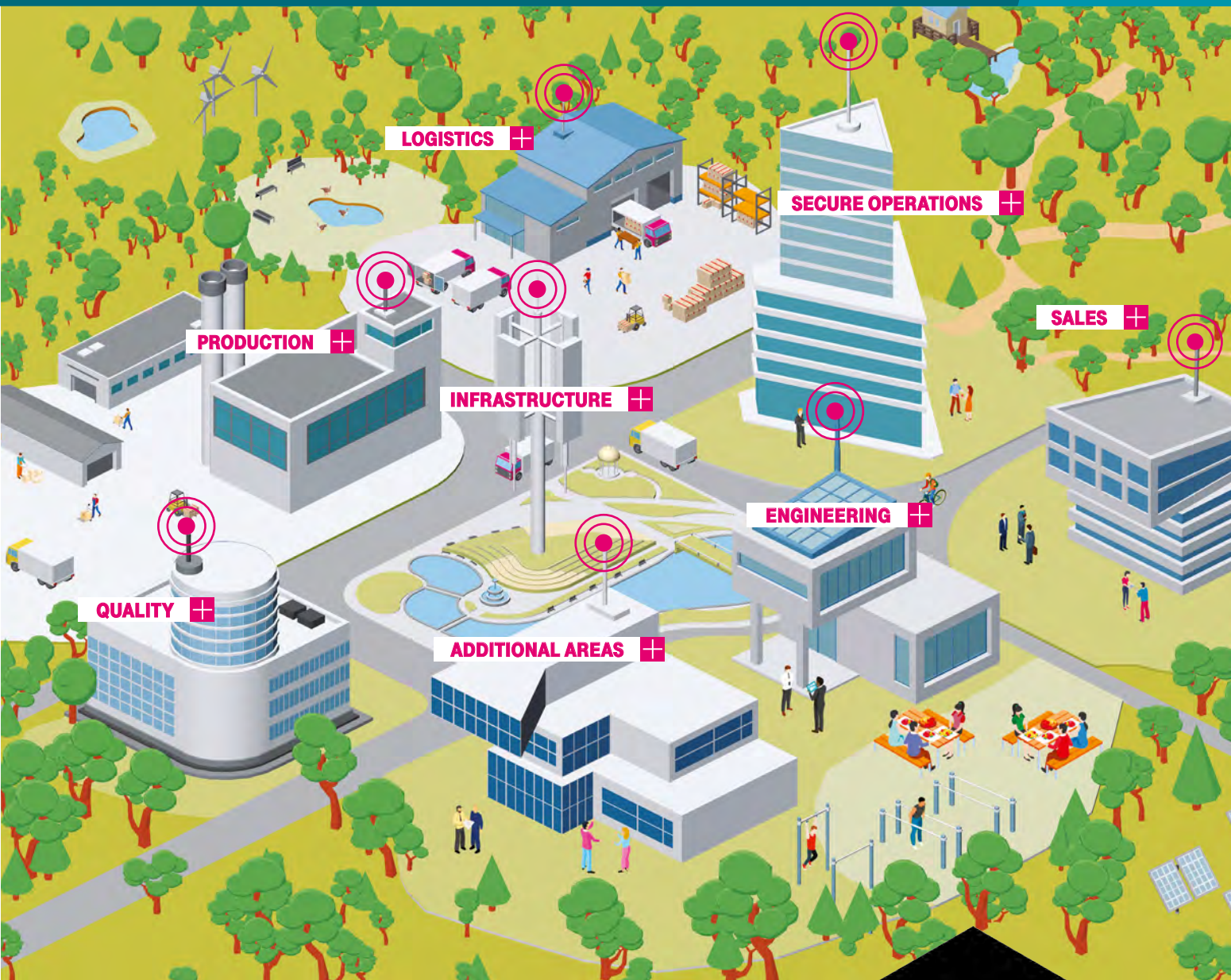
**Areeka WebAR Studio** is the community platform by Areeka for everyone who wants to enjoy the freedom of easily bringing their creativity to life using WebAR. The studio integrates vast features that simplify the AR creation process without need for prior coding or development skills for creating, viewing and sharing AR experiences. The beauty of the studio is that it is entirely web based and operates through a URL. No app is required! With the versatile capabilities including implementing videos, pictures, 3D-models and text, you can use the platform as a teacher, student, entrepreneur or individual.

**"Six degrees of freedom"** is the next stage of Amlogy's technology expansion drive to allow greater possibilities for users and customers. Powered by the SLAM algorithm, the WebAR technology is available on all devices and is more smooth. Furthermore, with WebAR Image recognition, use cases are diverse, enabling any printed material to come to life from business cards to magazines.

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# SENSEGLOVE

## Three stories of VR haptic gloves application

Haptic gloves enable users to feel virtual objects in VR environments. There are two principal types of haptic feedback: force- and vibrotactile -feedback. Force-feedback enables the feeling of touch: instead of passing through objects and picking them up using buttons on a controller, you can hold them with your hands and physically experience their size, density. Vibrotactile-feedback lets you experience textures and gives you “cues”: vibrations, button push, etc.

In 2018, SenseGlove created a VR haptic force-feedback glove using force feedback mechanism that applies resistance with magnetic friction brakes and vibrotactile actuators in each fingertip. Now SenseGlove is used in research, the automotive industry and marketing to name but a few. Here are three stories.

### Volkswagen: VR haptics for car assembly

Volkswagen and SenseGlove have created a VR training program for assembling the sliding door for the T6 van. With the SenseGlove on, Volkswagen workers can feel the shape and texture of all the door components as well as the tactile feedback they provide: the moment when cables snap into place, or when plastic components fit into each other. When working with a drill, thanks to force and vibrotactile feedback, workers handle it in a more responsible way, like it is a real thing.

### P&G: VR haptics for marketing

With the help of SenseGlove, P&G Health has created a VR haptic experience to raise awareness about nerve damage issues. By putting on the gloves, healthy people can first experience how it feels to have no nerve damage, and then the inconveniences of neuropathy and the frustration of patients suffering from that disease: hand tremors and difficulty picking up objects. This innovative way of marketing has attracted a significantly higher traffic to their booth at conferences and roadshows.

### Fraunhofer IEM: AR haptics for research

In collaboration with SenseGlove, Fraunhofer IEM has created an AR application to improve the manufacturing process of Hella Headlights; a lighting products supplier. Researchers used a mock-up of an assembly cell, an AR headset and SenseGloves to evaluate the process. The SenseGlove interaction technology allowed the user to grab components and guide them to where they must be placed during assembly. Thanks to that, Hella was able to streamline their manufacturing process design early in the product development stage.

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SENSIKS.  
SENSORY REALITY

Sensiks' flagship product is the Sensory Reality Pod (SRP). Designed as a modular framework for integration of technologies, enabling a range of real-life and fantasy-based experiences to be simulated in exquisite detail, with the body's 5 senses stimulated simultaneously. When these forces combine, the effect is highly convincing as travelers embark on a sensory journey that can span countries, oceans, and galaxies without physical boundaries of time and space.

Pods can be used to offer stress-reducing events, conjure 'out of body' experiences that induce euphoria, relive and process memories from the past, and improve quality of life by offering therapeutic solutions, joy, connection, happiness, and play.

#### **Integrator of senses**

The Sensory Reality Pod (SRP) hardware is built as a modular framework. Its design facilitates fast production, flexible technology integration and easy assembling. Sensiks' proprietary software can be used to orchestrate different types of SR experiences and applications.

#### **Interactive biometrics**

In addition to sensory stimulation devices, biometric sensors measure Heart Rate Variability (HRV), skin conductance and respiration of the traveler in the SRP, all of which feed into the experience, further heightening it.

# SENSIFY YOUR CONTENT AND DEFEAT 'THE GAP' WITH SENSORY REALITY

SENSORY REALITY (SR) APPLICATIONS ARE PART OF THE CURRENT TREND TOWARDS SIMULATED REALITIES. TOGETHER WITH VIRTUAL AND AUGMENTED REALITY, SR APPLICATIONS WILL BECOME A PART OF OUR EVERYDAY LIFE.

## Experience library

The SRP is equipped with modular electronics and SDK, software, and database to program, store, and share SR experiences and therapeutic applications. making the pod suitable for a wide range of applications such as relaxation, mental health, education, research, and recreation. A variety of multi-sensory experiences is offered via the integrated SR experience platform, ranging from soothing natural experiences such as a beach or a forest, biometric breathing exercises to full interactive VR gaming applications.

Pod owners have access to the content library. New (custom) content is continuously added onto the experience

database that is continuously growing as more and more partnerships are being formed within the SR eco-system.

## Content creation

For expansion of our content offer we are currently looking for suitable (off the shelf) content for improving quality of life in care homes, mental health, education, research and play. The content may be 360 Video, or (interactive) animations and we offer a shared revenue model on 'sensified' content.

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# XR COLLABORATION: BREAKING THE BARRIERS OF DISTANCE

XR technology offers a way in which we can work, learn, experience and interact with one another in a viscerally personal way, while remaining physically distant in our respective homes changes the way in which people perceive the digital and the real world.

XR enables you to organise virtual meetings to reduce commutes and to lower the economic and ecological footprint of your company; allows you to provide expertise at a distance, to perform remote education and training, and supports the inclusion of citizens with accessibility barriers.

There is a strong need to make communication and remote collaboration as transparent as possible, which can be achieved by increasing the quality of auditory and visual media, decreasing transmission delays and adding multiple sensory modalities like tactile and haptics. Existing avatar-based telepresence solutions do not provide the feeling of being present in a shared environment. Current communication tools, such as internet calling and video conferencing, only send voice and a partial 2D image of the body. And while avatar-based social VR has emerged as the newest form of telepresence to share a virtual world, participants in real-world industry applications need to be represented by 3D photo-realistic avatars instead of unrealistic graphical models. Furthermore, social touch is currently underexposed in current communication tools. A firm handshake or someone's body posture can provide most of the communication information during human interaction as they convey emotions and personality. Not having this information makes it hard for people to build trust, empathy and confidence. Therefore, a high-quality communication between users in remote

locations should take into account modalities beyond audio and video for people to feel each other's presence.

Holographic communication and volumetric telepresence also require a networking infrastructure that can handle high-bandwidth streams, while simultaneously keeping the end-to-end latency low. Such infrastructure needs to provide powerful in-network processing, reducing the need for heavy XR HMDs. Distributing processing across XR devices and the network, i.e. over the HMD itself, edge processing nodes and central cloud infrastructure, in a flexible way according to the specific needs of the service, allows for a better user experience and supports lower-end end user devices.

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