

AR/VR Innovation Report

August 2018

Presented by

XRDC

OCTOBER 29-30, 2018
San Francisco, Westin St. Francis Hotel

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AR/VR Innovation Report

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Welcome to the third annual 2018 XRDC AR/VR Innovation Report.

The data in this report was gathered from surveying over 650 professionals involved in the development of augmented, virtual, and mixed reality experiences. The wealth of data it contains is intended to offer up useful insight into a rapidly growing and diverse industry.

Notable findings from this research include a rising tide of self-funded AR/VR/MR development, a continued focus on the HTC Vive as the most common platform of choice, and increasing confidence in the profitability of the AR/VR/MR market.

Survey respondents also shared some of their favorite AR/VR/MR experiences, like *Beat Saber* and *Lone Echo*, as well as their excitement for the debut of the Magic Leap One headset.

This data was collected, organized and presented by the UBM Game Network, which runs the XRDC as well as the Game Developers Conference (GDC) and Gamasutra.com.

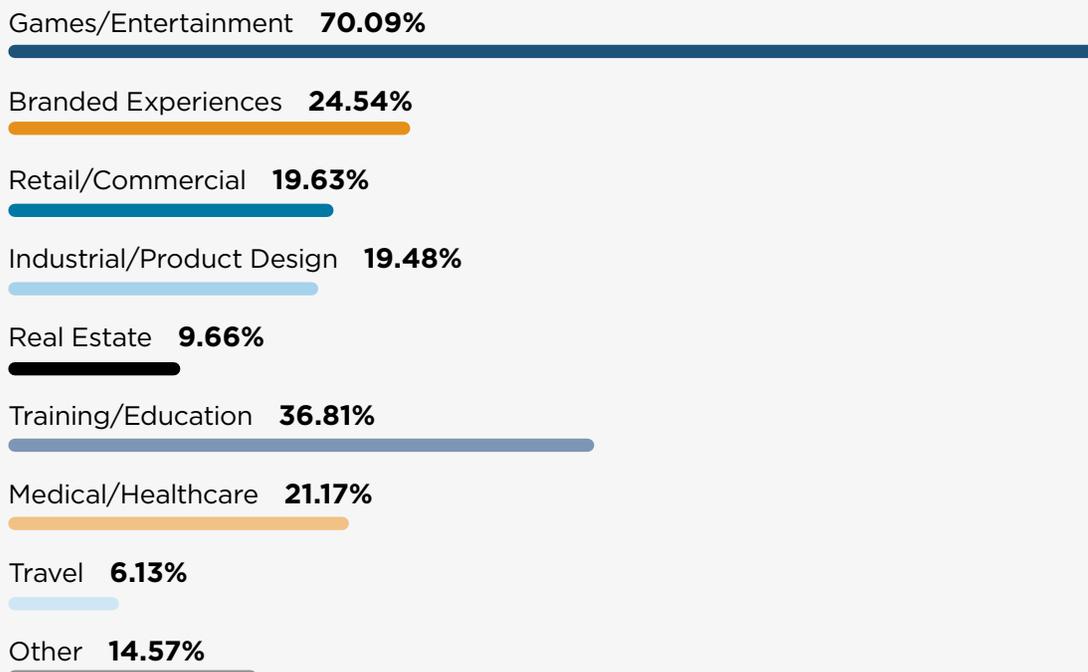
XRDC will take place October 29-30, 2018 and will bring together creators of immersive experiences of all kinds—including groundbreaking work for games, education, entertainment, healthcare, medicine, training, automotive, sports, UX, data visualization, brand experience, and more.

MOST AR/VR/MR DEVELOPERS ARE STILL FOCUSED ON MAKING GAMES

To get a better sense of where AR/VR/MR professionals' interests lie, we asked them to tell us what sort of experiences they're currently focused on creating. The most popular answer, as in years past, was Games and Entertainment, accounting for 70 percent of the developers we surveyed. It's a strong majority, but actually a slight dip from our previous survey, when 78 percent of respondents said they were focused on Games/Entertainment.

What is the focus of your current/potential work in AR/VR/MR? (choose all that apply)

Games/Entertainment **70.09%**



Branded Experiences **24.54%**

Retail/Commercial **19.63%**

Industrial/Product Design **19.48%**

Real Estate **9.66%**

Training/Education **36.81%**

Medical/Healthcare **21.17%**

Travel **6.13%**

Other **14.57%**

This year Training/Education proved to be the second most popular response, with 37 percent of respondents saying it was a primary focus of their AR/VR/MR work. That's a significant rise from last year's survey, when just 27 percent said they were making such teaching tools.

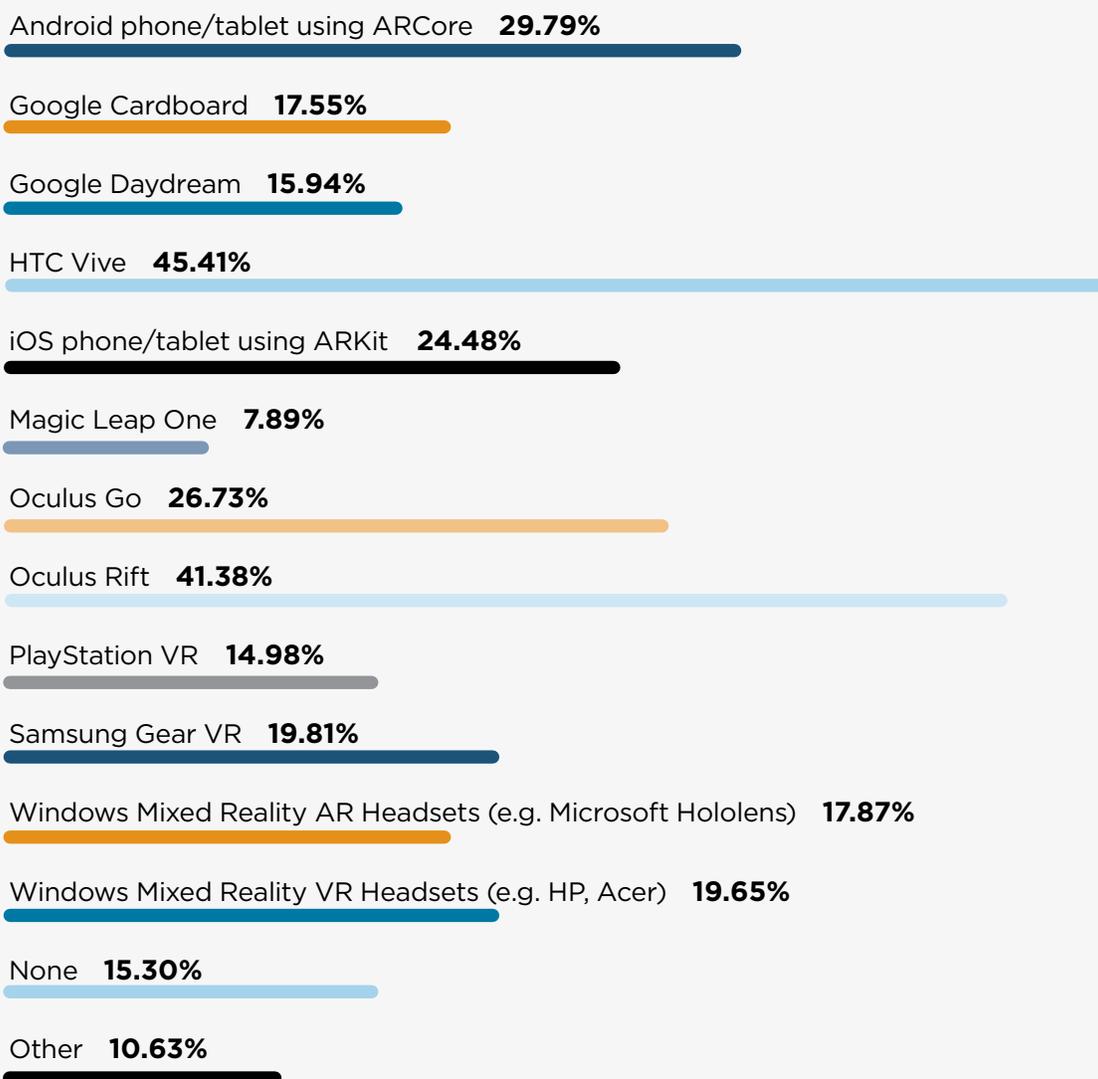
Like last year, Branded Experiences (like furniture showrooms or virtual vacations) took third, with 25 percent of devs surveyed saying such work was a prime focus. Here again we see an uptick in dev interest in this area, as last year just 19 percent of those surveyed said they were focused on branded experience development.

HTC VIVE REMAINS THE MOST POPULAR PLATFORM AMONG DEVS, BUT INTEREST IN VR IS DIPPING

When we asked our survey respondents which AR/VR/MR hardware they're targeting and why, the HTC Vive headset proved most popular for the third year running, netting the largest share (45 percent) of developer interest.

As in years past, Oculus Rift proved the second most popular platform (41 percent), but this time around Android beat out Samsung's Gear VR headset to take third place, with 30 percent of devs surveyed saying they're focusing on making AR experiences for Android phones and tablets using Google's new ARCore toolset.

Which AR/VR/MR platform(s) are you developing for right now? (choose all that apply)



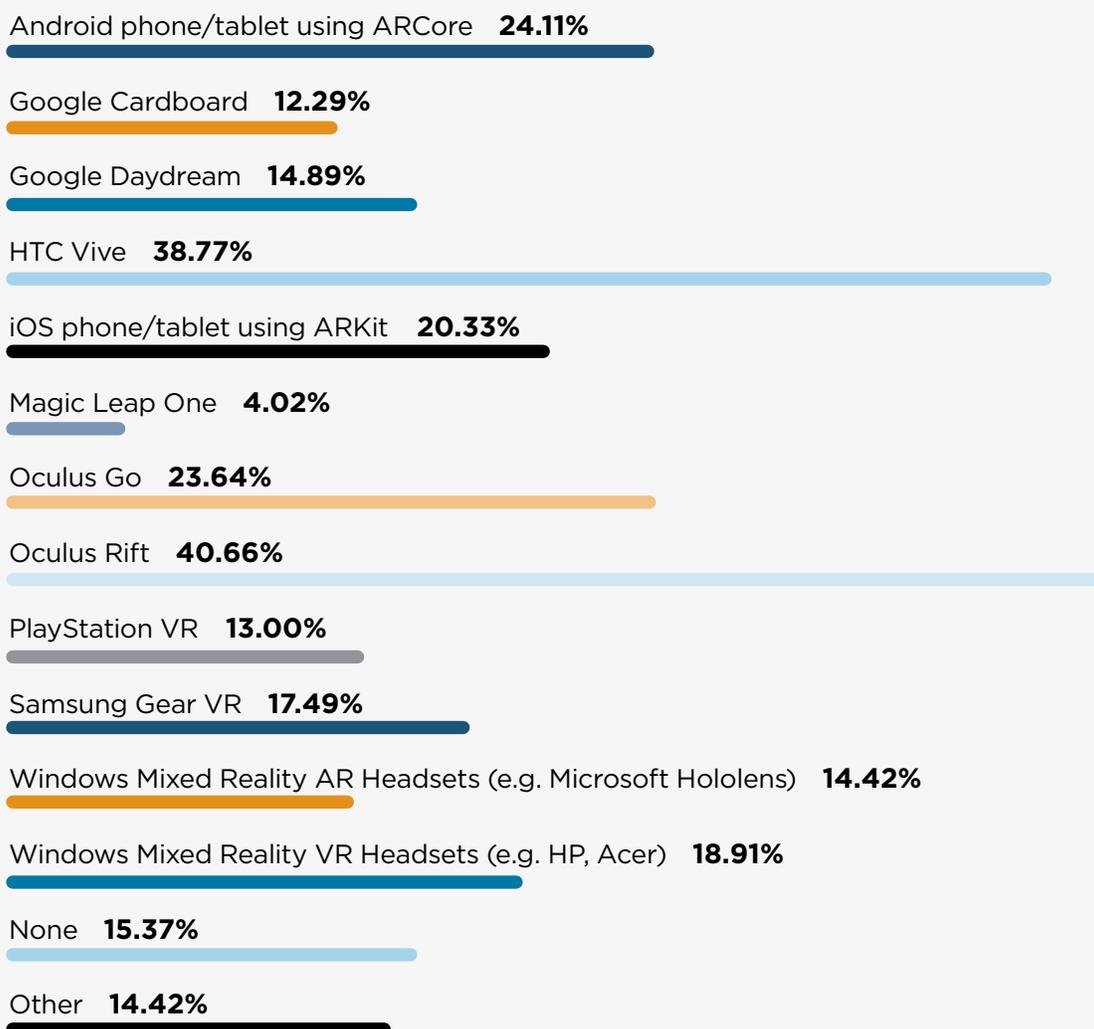
This is a notable shift from last year, when VR seemed to dominate devs' interest: 56 percent of devs surveyed last year said they were targeting the Vive, 49 percent said Oculus Rift, and 33 percent said Gear VR.

The field of AR experience design has matured significantly since last year's Innovation Report, so this year we got a bit more granular in asking devs about which AR platforms they're focusing on. The results are intriguing: In addition to the 30 percent who are focusing on Android, 24 percent of devs surveyed say they're making AR experiences for iOS devices (using Apple's new ARKit toolkit), and 17 percent say they're targeting Windows Mixed Reality AR headsets like Microsoft's HoloLens.

Also, this time around 8 percent of devs surveyed said they're targeting Magic Leap One, the developer edition of Magic Leap's vaunted MR headset. It's a small sliver, but still more than double the 3 percent of devs surveyed last year who said they were making experiences for Magic Leap.

Looking ahead, we also got some surprising data about where devs are planning to release their next project. The Oculus Rift proved most popular here, with 41 percent of devs surveyed saying their next project would be released on the vVR platform. 39 percent said HTC Vive, and 24 percent said Android devices (using ARCore).

Which AR/VR/MR platforms will your next title be released on? (choose all that apply)



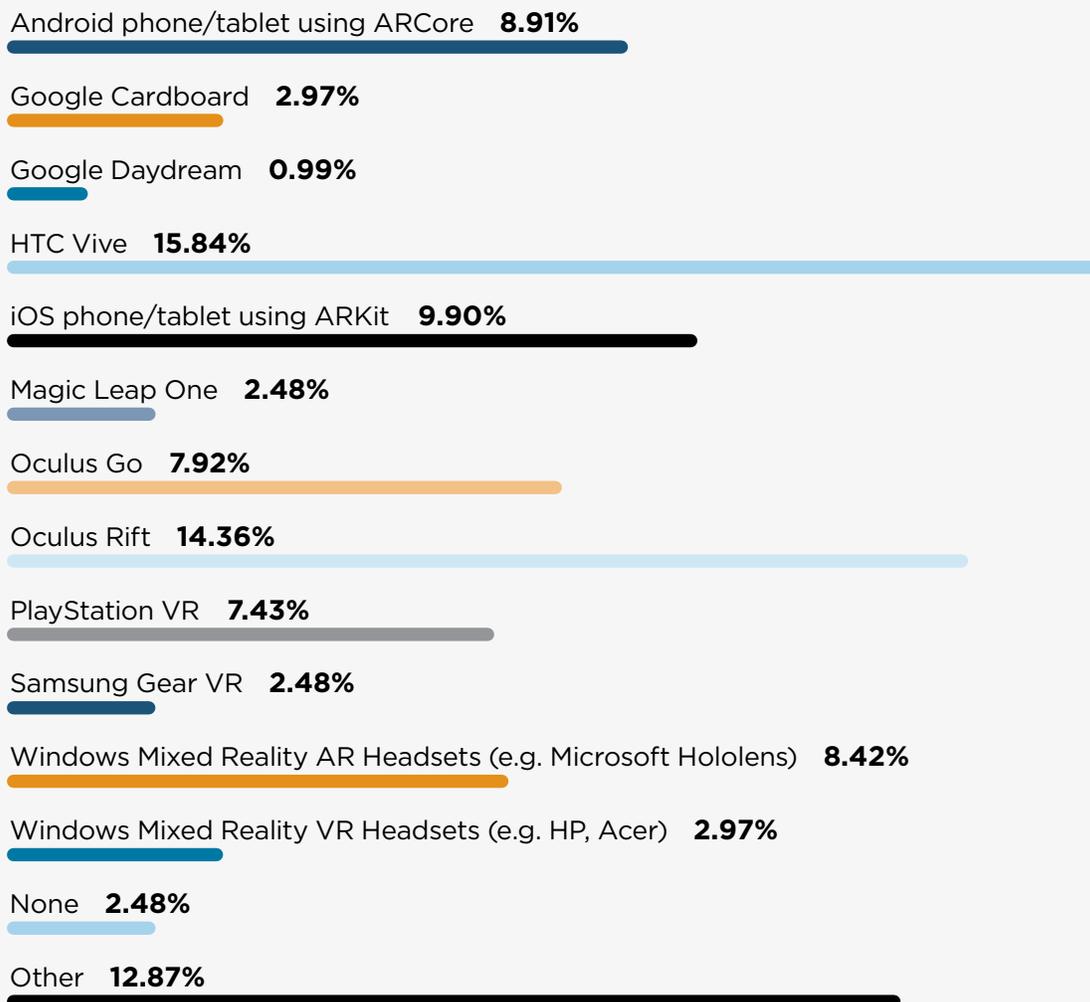
This is a big change from last year, when the Vive proved the most popular platform among devs for both current and future projects. The fact that the Rift now beats out the Vive among devs in terms of potential sheds some light on where the VR industry is headed in the near future.

1 IN 3 DEVS ARE WORKING ON A PLATFORM EXCLUSIVE

The question of whether or not to release a project exclusively on one platform continues to be a tricky one for devs, and this year about a third of respondents (32 percent) said their next experience would be released exclusively on a single AR/VR/MR platform.

This is exactly in line with the results of last year's survey, when we asked the same question and saw 31 percent of devs surveyed answer in the affirmative. Given that two years ago just 21 percent of respondents said they were working on a platform exclusive, it seems that after a brief surge, dev interest in exclusivity deals is holding steady.

Which AR/VR/MR platform will your next project be exclusively released on? (choose one)



So where are these exclusives going? We asked devs who said they were working on one to tell us which platform it was for, and once again the HTC Vive proved the most common target (16 percent) followed by the Oculus Rift (15 percent).

Intriguingly, despite offering a wide variety of platforms to choose from in our survey (everything from the Android/iOS to PlayStation VR to Magic Leap One), the third most common platform for proved to be “Other”, with 13 percent of devs saying that’s where their next exclusive will debut. This is a significant shift from last year, when the most popular platforms for exclusives were the Vive (35 percent), the Rift (13 percent), and Samsung’s Gear VR headset (13 percent).

MORE DEVS RELY ON FUNDING FROM COMPANY COFFERS (RATHER THAN DEVS’ OWN POCKETS)

If you follow the money in AR/VR/MR experience development, our survey results suggest you’ll most often end up at the doors of the companies that are doing the work themselves. As in years past, the most popular answer for where devs’ funding comes from is the company’s existing funds (45 percent), followed by a dev’s personal funds (27 percent) and funding from a client (21 percent).

Where does your funding come from? (choose all that apply)

Alpha Funding (e.g Steam Early Access) **1.38%**

Angel Investors **9.15%**

Client(s) **21.59%**

Company’s existing funds **45.25%**

Crowdfunding **2.59%**

External Publisher **3.45%**

Government **11.40%**

Personal Funds **26.60%**

Venture Capital **8.46%**

N/A **12.78%**

Other **6.91%**

That roughly matches up with the results of last year's survey, but this year we saw a big jump in the percentage of devs who say they're being funded by their company's coffers. Last year, 39 percent said company's existing funds, 31 percent said personal funds, and 21 percent said their client(s) picked up the tab.

This may suggest that more companies are finding AR/VR/MR development to be a sustainable business and are able to justify spending company funds on developing for AR/VR/MR headsets.

Intriguingly, our results also indicate venture capital and angel investment in AR/VR/MR development is at an all-time low -- at least, among our survey respondents. Just 9 percent of those surveyed said their funding came from angel investors, and roughly the same amount said their funding came from VC.

When we look at this data alongside survey results from prior years, we see a slow trend away from external investment and towards self-funding (i.e. personal- and company-funding) as the AR/VR/MR industries mature.

DEVS ARE CONFIDENT AR/VR/MR IS A SUSTAINABLE BUSINESS, AND ARE GROWING MORE BULLISH ABOUT HOW PROFITABLE IT CAN BE

So, does this mean AR/VR/MR development is a safe and sustainable industry? The vast majority of the folks we surveyed seem to think so: as in years past, 95 percent of respondents said they believe AR/VR/MR development is a long-term sustainable business.

But when we asked them when they thought AR, VR, or MR would turn a profit for themselves and/or their client(s), just 15 percent said it was already doing so. 12 percent said they thought it would be profitable in the short-term, 38 percent said medium-term, and 23 percent said long-term.

When do you believe AR/VR/MR will generate a profit?

Currently profitable **14.69%**

Short term **12.04%**

Medium term **38.05%**

Long term **22.83%**

Never **1.42%**

N/A - project not tied to profitability **10.97%**



That's a more promising outlook than what we saw last year, when 16 percent said AR/VR/MR would be profitable in the short-term, 39 percent in the medium-term, and 38 percent said long-term.

This was the first year we specifically asked whether respondents were already turning a profit, but the shift away from a focus on long-term and towards short- or medium-term profitability suggests that devs are more confident in the health and viability of the AR/VR/MR markets.

"We are making \$4,000 currently and need to hit \$12,000 a month to be profitable and pay all expenses," wrote another respondent who believed AR/VR/MR would be profitable in the short term. "We have a consistent 10-25 percent growth every month."

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10-25 percent growth
every month.*

Another respondent who said AR/VR/MR was already profitable wrote in to explain their reasoning thusly: "In 2018, for example, we've been developing A) service-based XR experiences which are immediately profitable (like VR rollercoasters and traveling branded VR pop-ups), B) co-funded XR experiences for our co-owned FEC [family entertainment center] venues in multiple countries (like NatGeo and DreamPlay), which break even at deployment, while shared proceeds build profit in the mid-to-long term, and C) internally-funded free-roaming LBE [location-based experience] VR experiences (like Alien: Descent VR) which are the foundation of long-term investments in our co-owned VR/AR/MR-driven LBE FECs."

"Our focus is primarily education, and becoming profitable in this space will require time as affordable platforms are still emerging," wrote one respondent. "But I remain optimistic, so will go with the medium."

Also, we noticed that the percentage of survey respondents who said AR/VR/MR will "Never" be profitable dropped significantly year-over-year, down from 8 percent last year to 1 percent this year (or about 8 people).

MOST PROFESSIONALS REMAIN CONFIDENT THAT OVER TIME, AR WILL BE BIGGER THAN VR

We like to ask AR/VR/MR industry professionals whether they see AR or VR will eventually win greater market share, and this year (as in years past) AR won out.

75 percent of the industry professionals we surveyed believe AR will be bigger than VR, in the long term, with many respondents citing AR's potential accessibility, broader variety of use cases, and integration with the real world.

"AR makes augmented content easy to access because users are able to engage with AR via their mobile devices or headsets," wrote in one respondent. "It's also less of a commitment and less socially isolating. However, I believe AR and VR can solve very different problems."

"AR can integrate into our lives in real-time," added another respondent. "VR is interesting but highly modal and awkward, and needs many massive advances in order to be enjoyable for a mainstream audience."

"Location-based AR and MR data will be ubiquitous as soon as the threshold for seeing it in a natural, unobtrusive way is significantly lowered," wrote another. "VR, with its physical threshold of having to immerse oneself and shut oneself out from one's surroundings, is more similar to reading a book. Both are viable mediums, but very different."

AR can integrate into our lives in real-time. VR is interesting but highly modal and awkward...

"Actually, I think both will do well," explained another. "Originally, I thought AR was a waste of time, but new developers have come with products that show real potential such as the AR Star Wars game. The only difficulty I foresee is the cost associated with the gear that works best. When the cost is reduced, then that will help to open the market to more people and professions."

HIGH PRICES, OVERHYPED HARDWARE, AND A LACK OF COMPELLING CONTENT SEEN AS THE BIGGEST MISSED OPPORTUNITIES IN AR/VR/MR

What are the biggest missed opportunities in the AR/VR/MR market to date? It's a perennial question that we like to put to our survey respondents, and this year we got a bunch of insightful responses.

As always, the cost of entry (especially for high-end VR headsets) is a thorny issue for some industry professionals. But this year we saw fewer complaints about the high cost of buying into AR/VR/MR and more concerns that too much hype and too many gimmicky, ephemeral experiences were poisoning the well.



“For VR the biggest mistake was overhypeing the early generation before anyone knew how to build compelling content and the only consumer devices available were overpriced for the (non) existing market,” wrote one respondent. “On the other side of the spectrum were cheap Cardboard headsets with poor experiences. This has put VR especially in a bad spot where some consider the tech dead or awful. We would have been better off withholding the hype train until this year...for AR things are looking much brighter as it’s still just portrayed as something you do with your phone. AR still has the hype ahead.”

“The industry really needed an HMD like Oculus Go when the hype for VR was at its peak,” wrote another. “There has also been a disproportionate focus on developing hardware for VR and AR, and not enough of a focus on developing software to support such a vast hardware ecosystem.”

The industry really needed an HMD like Oculus Go when the hype for VR was at its peak.

“Every game is a gimmicky 30-minute side show,” opined another respondent. “Nothing continually draws me back in for consecutive sessions.”

“User interactions,” were the biggest missed opportunity, according to one respondent. “I feel that a lot of companies are using AR and VR more as gimmicks and not really asking the general population what their pain points are. Also, AR in automotive design. Car manufacturers were some of the first to use AR with backup cameras: a huge missed opportunity would be AR on the windshield.”

“Funding, funding, funding,” said another. “These platforms need premium content across the project funding spectrum and no company, except Oculus and HTC to a LIMITED extent, want to incur that expense. It’s like they ignored failed video game console launches of years past.”

“Price point has ALWAYS been an issue, and the cost of the tech has done nothing but slow the market down,” concluded one respondent. “PSVR removed the cost of the PC and replaced it with the 60 million devices already existing in people’s homes! And the \$200 Oculus Go has been selling out both in stores and online. Plus, there have already been more Oculus Gos distributed in its first few months than the total amount of Oculus Rifts sold in its first year. The reason AR has proven to be so much more viable than VR to date is because the main component to view AR has been a smartphone, a device BILLIONS of people already own. Mass adoption of XR is going to come from accessibility, not ‘killer apps!’”

THE TOP UNSOLVED PROBLEMS IN AR/VR/MR TODAY INCLUDE COMFORTABLE LOCOMOTION, LIGHT AND CHEAP HEADSETS, AND QUALITY CONTENT

We also encouraged survey respondents to look past missed opportunities and tell us, in their own words, what they believe to be the biggest unsolved tech or design problem currently facing today’s AR/VR/MR professionals.

The responses proved to be as interesting and diverse as the people who provided them, but a few common concerns bubbled to the surface. Among them are the discomfort issues that dog VR (especially during locomotion), the weight and cost of modern AR/VR/MR headsets (and their lack of accommodation for makeup or glasses), and the need for experiences that aren’t shallow or gimmick-y.

“The biggest unsolved technology problem and design problem in AR/VR/MR has been versatility and integration,” wrote one respondent. “Moving outside of the range of a gimmick and into the future of storytelling, information engagement, and integrative social dynamics is the most significant movement needed to change the role of AR/VR/MR as a computing platform.”

“For VR locomotion is the biggest issue,” added another survey-taker. “Hand/head interaction works and will keep improving but moving around in VR without losing immersion or VR-sickness is still a challenge. Unless you play location-based VR.”

The reason AR has proven to be so much more viable than VR to date is because the main component to view AR has been a smartphone... Mass adoption of XR is going to come from accessibility, not ‘killer apps!’



“Battery technology is holding hardware back, but from a design perspective, the (understandable) desire to co-opt video game traversal design is backing experiences into an unwinnable locomotion problem,” stated another. “There is so much we can do inside a single room, translating the player across a giant world seems like the wrong place to start.”

“VR locomotion and AR object interactions have by far created the most hype before the release of consumer headsets, but after ~2 years of consumer devices, it is clear that these problems have significantly hindered the user experience, and been extremely difficult problems for developers to solve,” one respondent said.

Another explained that “as a VR filmmaker, the biggest problems are limitations in camera hardware technology, stitching software technology, and headset display resolution.”

“AR -> hands-free operations via glasses,” wrote one respondent. “VR -> cables, cables, cables, [plus the] technology setup [is] too complex. MR -> sensory capabilities and FOV.”

“Better haptics?” suggested another. “Honestly, getting the answer to this question is part of why I am interested in this conference!”

Battery technology is holding hardware back but from a design perspective, the (understandable) desire to co-opt video game traversal design is backing experiences into an unwinnable locomotion problem.

BEAT SABER, LONE ECHO, AND MORE ARE AMONG INDUSTRY PROFESSIONALS' TOP EXAMPLES OF TODAY'S STAND-OUT AR/VR/MR EXPERIENCES

Nobody knows what's good in the worlds of AR/VR/MR better than the professionals who make their livings in those fields, so we gave our survey respondents room to write in about any games, apps, or other projects from the last year that they feel are standout examples of what can be done with these cutting-edge technologies.

"Fantasynth for VR: Shows how abstraction in VR can be used to shape an experience not possible elsewhere," wrote one respondent. "*Beat Saber* for VR: Created a fun, immersive game with a small team around the medium's constraints rather than trying to be something it can't be."

"*Lone Echo*. Their hand interaction model rocks," said another.

One of the folks we surveyed suggested "House planning apps such as the IKEA one. It solves a real problem (of fitting furniture in your home before buying) and provides huge business opportunities (being able to buy straight online, without having to go to the store to see how the furniture looks)."

"VR: 'Welcome to Light Fields' by Google," read one response. "AR: iPhone X with its cameras designed for AR."

"BBC VR World Cup football coverage," opined another survey-taker, citing its "wide appeal."

"Creatively there's been a lot of progress and visionary projects. I particularly like projects like 'Zikr' that brought transcendental Sufi dancing to VR as it was really using what VR can give in terms of communicating embodied movement," said another. "For my interests, I love the work of [the Aboriginally determined research-creation network] Aboriginal Territories in Cyberspace. It is visionary, political, necessary, enlarges the scope of what technological communication can facilitate and works at healing the horrors of colonization and repression of other cultures and ways of understanding."

And while they debuted well over a year ago, both the AR game *Pokemon Go* and *The Void* immersive VR location-based experience received multiple shoutouts from our survey respondents.

"VR = *The Void* and other experiences that marry VR with real-world movement. I also think *Quill* [VR art tool] on the Rift for design and art is pure magic," said one respondent. "AR = I haven't seen any AR apps yet that really capture the magic or potential of the platform. Still looking for it."

I particularly like projects like 'Zikr'...it was really using what VR can give in terms of communicating embodied movement.

“All of the Ready At Dawn Echo games [*Lone Echo*, *Echo Arena*] have been incredible!” a respondent exclaimed. “The floating mechanics, the graphics, the clever use of the touch controls, all combined making a truly immersive story experience. *Beat Saber* has been an incredible example of an Indie developed VR game rising to the top! I just watched a video of Niantic’s multi-player ‘Laser Tag’ experience on the phones, which was very similar to the HADO [AR eSports] tournament experience in Singapore, and that gets me excited about the possibility of more virtual experiences overlaid into our real world.”

And perhaps there’s more to come in the near future; one respondent wrote that “I can’t tell you due to NDA.”

AR/VR/MR PROFESSIONALS ARE EXCITED ABOUT THE DEBUT OF MAGIC LEAP ONE AND THE NEXT GENERATION OF AR/VR/MR HEADSETS

Looking ahead, we opted to close out the survey on an upbeat note by asking respondents what they were most excited about in the next 12 months.

The debut of the Magic Leap One mixed-reality headset (or at least, its “Creator Edition” developer kits) was a popular response, as was general enthusiasm for hardware to become standalone and smaller, more affordable and more effective at facilitating immersive experiences.

“Standalone VR headset adoption (hopefully access to 6DOF), and the release of the Magic Leap One,” wrote in one respondent.

“Standalone VR headsets with 6DoF [six degrees of freedom],” said another. “This will change everything.”

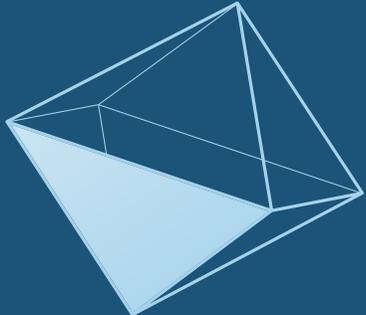
“Magic Leap is real progress, single RGB camera computer vision is progressing rapidly, HoloLens 2 will be quite something,” read one response. “Niantic’s Harry Potter title, ‘AR cloud’ tech from YouAR and 6D, [and] Leap Motion are really coming of age.”

“I think I’m most excited to see how the tech shrinks and whether or not we can finally get a wireless option that has the battery life and resolution to capture consumers’ attention,” one survey-taker said.

“Even though the Magic Leap’s latest showings haven’t been great, its success could be a game changer,” responded another.

“In a weird way, I find the lack of external hype to be therapeutic because the VR/AR/MR enthusiasts have remained in the industry to create great content and continue to push the boundaries for development and design in this field,” another concluded. “So I’m really excited to see what new techniques or techno or technologies creators come up with!”

Standalone VR headsets with 6DoF [six degrees of freedom]... will change everything.



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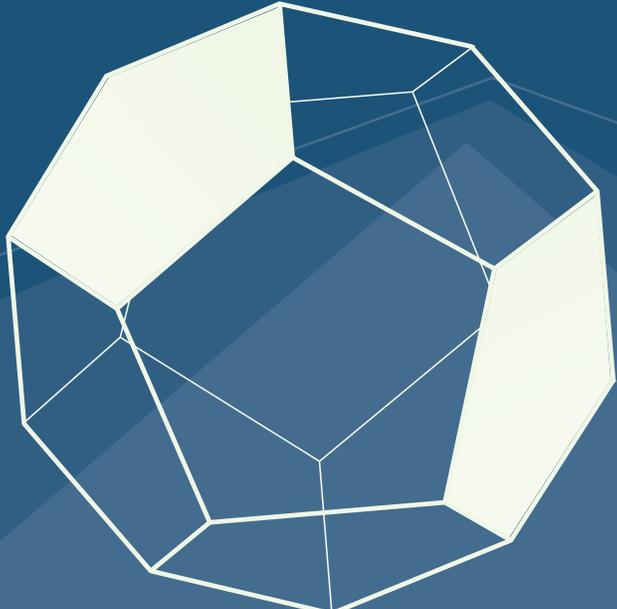
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Appendix: Literal Answers

When do you believe AR/VR/MR will generate a profit, and why?

CURRENTLY PROFITABLE

- » It is already generating profits in a B2B solution, as well as advertising thanks to Facebook.
- » Immediate needs; feasible technology and market demand
- » We have clients that are currently paying for solutions that incorporate immersive tech, but purely on a PoC basis. Results have been promising, however, and we see a short term future where more profitable endeavors are likely.
- » There are currently VR experiences that make money as well as at home and mobile gaming.
- » But generally i don't think for another 3-5 years before there's an acceptable market.
- » Have to make the right type of content within the correct supporting budget that makes sense. Currently this means content needs to be made by small teams, using small budgets until EA when they can test market and see if its worth investing more.
- » In 2018, for example, we've been developing A) service-based XR experiences which are immediately profitable (like VR roller-coasters & traveling branded VR pop-ups), B) co-funded XR experiences for our co-owned FEC venues in multiple countries (like NatGeo and DreamPlay), which break even at deployment, while shared proceeds build profit in the mid-to-long term, and C) internally-funded free-roaming LBE VR experiences (like Alien: Descent VR) which are the foundation of long-term investments in our co-owned VR/AR/MR-driven LBE FECs.
- » For certain use cases XR is already profitable, notably industrial / commercial training and compliance.
- » Certain aspects of the industry are decently profitable, mostly in production services. Games are starting to see a return as well.
- » There is greater demand now and it is more popular.
- » Some titles are already profitable, many more will be
- » I run an Arcade and I need money now!
- » My projects only begin when funded by clients that want it.
- » For whom? Individual companies make mistakes NO MATTER THE TECHNOLOGY. If a given company fails, that's not necessarily because the tech is not profitable; conversely companies can succeed (at least in the short-term) on the back of bad tech.
- » Plenty of opportunities in the Serious Games/Training, as well as first mover opportunities in the entertainment space.
- » VR can be profitable as long as developers are appropriate about budgets.
- » We do profit in retail enterprise solutions.

SHORT TERM

- » VR is on the rise, AR is still vastly misunderstood and needs a few years.
- » a little better hardware, and some more serious Dev for games.... also: Haptic tech +/- RNDR are just around the corner....
- » the hardware that we are working on is in beta and has no issues at the moment
- » It depends on the target market, but I can see it being profitable in industry solutions such as training in the very short term.
- » With the addition of alternative means of direct revenue and commerce, there is already the potential for profit
- » We are addressing directly 500 million fitness people
- » Many product companies are developing next-gen hardware so, I hope the next big thing will happen soon as consumer device.
- » Today's announcement from Apple sends a strong message that this really is a "thing". The buzz is out there.

- » rapid consumer adoption for specialized training that is flexible, accessible, and requires zero cost hardware to implement.
- » Small business/side project that doesn't need a lot of money to be successful.
- » We are making \$4,000 currently and need to hit \$12,000 a month to be profitable and pay all expenses. We have a consistent 10-25% growth every month.
- » There are already profits to be made in the XR industry, so I don't quite understand the question. However, I think the industry will become more profitable in the next year or so, as next-generation standalone VR HMDs proliferate.
- » We have to focus on the right things. Currently, we have to acknowledge the fact that the home market is still very small, but lots of things can be done in the location-based market.
- » Entertainment revenue sources will continue to be a challenge for a few more years, but enterprise interest is ballooning and should provide good revenue for teams pursuing it even by the end of 2018.
- » with all of the portable AR devices just around the corner, we expect to see exponential growth in the private sector
- » AR near term with industrial applications and VR long term with mixed immersion applications

MEDIUM TERM

- » Our focus is primarily education, and becoming profitable in this space will require time as affordable platforms are still emerging. But I remain optimistic, so will go with medium.
- » contingent on research (regarding my own personal project).
- » VR is still in the early adopter phase. The requirements to enter are too high for the current tech of the average user. Advances such as foveated rendering and stand alone headsets will be need to make it accessible to the mainstream, which wont happen till at least 2020. For now a studio's main method of survival is keeping costs low.
- » the AR / VR and MR technology access values are still very high
- » Technology penetration in the market (consumers) not yet there
- » Like most video/360 content, still seems profitability is still a ways away given the content is given away for free
- » AR and VR can already generate profit if you make a hit. For it to be a sustainable climate to the wider range of developers the market must grow and prices come down. I believe headsets such as Oculus Santa Cruz that packs the full experience into a mobile headset that can be used wherever you want will mark the beginning of a wider adoption. Oculus GO is already proving to work as a consumer device. However as the new headsets aren't on the market yet we will keep seeing a slowly rising market with PC/Console for another year before new headsets comes to market and another year or so for them to gain market share.
- » it depends on the public awareness level of this technology among stakeholder and knowledge transfer entities
- » Consumer growth has slowed a bit for desktop VR headsets, but hardware sales for portable VR headsets (i.e., Oculus GO) creates more opportunity to reach more audiences.
- » we need more longer term bigger investment in vr titles. Currently, everything feels like a test case or a side show
- » I was skeptical about VR until I tried a HTC Vive, then I ordered one for myself. I suspect there are a lot of people that need to be exposed before they might consider it, but moreso headsets (especially non-wired) are moving away from needing PC know-how to "just works" territory. As it gets easier to just buy a headset and go, some of that adoption friction goes away.
- » We use it to sell. Within a couple months any small project is possible in VR, for example. We can put something together with the help of a vendor and go out and sell. So, Medium Term.
- » It's still a "gimmick" and hasn't hit critical mass for adoption or usefulness. But I think that with Apple and Samsung chasing AR use-cases, that should change in the next few years and will tip the scales to making AR (and to a lesser extent VR) a more profitable business path.
- » Standalone market is showing better possibilities of mass market reaching. LBE and VR Arcades are also a good source of revenue for content producers right now and for the near future.
- » NA

- » When VR first came on the scene it was a novelty, people immediately dismissed and said the user base wasn't there and no one was going to make any money. This morning I saw that High Fidelity raised \$35 Million dollars in a Series D fund, well into their investment cycle. And Magic Leap has literally raised Billions of dollars. Investors aren't stupid people, and wouldn't put up that much money if they didn't think it was going to turn a profit. This isn't an imaginary market anymore, it's everywhere! And now with major players like Google, Microsoft and Apple putting their money into the race, it's only a matter of time until everyone in the world sees some sort of Virtual Reality integration into their homes, the workplace and more and more VR entertainment experiences.
- » Exceptional can't get anywhere else content is required before adoption occurs.
- » Not enough people know how to use VR/AR to benefit their business. Cardboard not used to distribute content so the general public can experience basic VR
- » not clear, depends on game, experience design -> Product
- » Proliferation of affordable, high-quality hardware, software, and content.
- » I believe the current market projections are way too aggressive. Still many issues in shrinking the displays and increasing the tracking precision.
- » More enterprise use cases for VR that prove good ROI. Cheaper, untethered HMD options. The language of immersive content will begin to gel.
- » Some B2B VR companies are profitable today in 2018 (e.g. VR training, location based VR). Mass market B2C will take longer, as the install base needs to grow - probably via a breakout VR product not yet on the market. If this ends up being as soon as Oculus Santa Cruz, it'd still 2-4 years before the install base approaches current gen console levels - so I'd guess 2021.
- » Medium for AR because consumers own smartphones. Longer term for VR due to price points. LBVR should take off in the next year. Enterprise training in XR seems to be taking off quite well.
- » The question dodges the complexities in the market. When more people have product in hand or come to think of their phones in AR/MR terms there will be viability for various experiences. Until then profitability will only come to a few companies.
- » Takes time to develop
- » We will have to wait until such time as the underlying technology becomes affordable to most small companies and individuals.
- » I believe location based attractions will start generating a profit soon if not already. I believe certain BtoB applications are already making a profit in the AR arena.
- » Needs for more affordable technology Still missing something that is a real "innovation" Needs for better, more versatile and innovative way of interacting with the virtual environment
- » AR can be profitable when attractive mainstream hardware shows up.
- » Where the technology exists today, in order to consume content, is not feasible to the average consumer. However, there is usable content for enterprise use in terms of training
- » There still needs to be more market penetration and adoption before there's enough device out to make a profit.
- » Needs wider adoption from users
- » Outside the games industry there is an awareness of the tech but it hasn't generally become mainstream use in Landscape Architecture yet.
- » For VR, hardware and the usability of the platform still needs to catch up. About a year or two more.
- » still climbing adoption curve.
- » In 5 years it will be key industry in the market
- » There is still more base growth necessary, but before it hits its long term potential there will be options to be cash positive
- » Just in general. I think once the htc vive pro comes out vr will grow a lot more popularity therefore more money etc.
- » Brand building
- » Training is a mid-term profit generation

LONG TERM

- » Not having clients willing to pay for the amount of work.
- » Uptake and revenue model
- » we teach the world so far

- » These areas are still very new despite how long the platforms have been in development. For example, portable phones were said to be placed in the trunk of a car (according to what was shown in the old movies), now wear watch our phones on our wrists. If computers started from room-size to a tablet, then profits can still be made on a grand scale, once the manufacturers get over the panic of the "supply and demand" notion from the masses and devote some time to shrink their products as an "everyday use", then developers could make a profit.
- » A long road before there's a critical mass of consumers
- » Price
- » There still hasn't been either the truly breakthrough hardware and more importantly the software that makes a given piece of hardware a "must have". Neither VR or AR have had their "Super Mario Bros".
- » Until the hardware becomes wireless or at the very least the hardware becomes less encumbered by wiring and the price comes down I don't see it becoming a viable option for the current market
- » Need a much larger user base
- » There still needs to be a larger user base and quality titles released in the various AR/VR platforms before people start making a profit.
- » No Finance and training
- » Think it already can draw some profit, but not at the scale of big-budget console/PC gaming. It needs to find a place as a hobby that fits into peoples lives.
- » Save for exceptions like Pokemon GO that has an AR element, users will find it hard to want to immerse themselves with nearly \$1k worth of equipment or something that requires holding your phone in weird and unconventional ways to interact with a product.
- » It's still such a new market, don't think it will be profitable until it becomes a much more normal, integrated, and affordable part of consumers' lives (at least in the way that current video game consoles are)
- » It will take a while before everyone comes on board. Really for early adopters at this stage.
- » Hardware, cost and ethics play major roles in the adoption of XR.
- » We need the technology to require less technical skills from the end customers, and lower cost of the equipment to buy.
- » Adoption challenges, killer use case.
- » User adoption is incredibly important. Until more users have access to AR/VR/MR and use it on a daily basis (Snapchat, Instagram, other social media), then it will be a stagnant technology.
- » Not accessible enough and needs expensive hardware. Experience is very gimmicky too.
- » Currently, the AR games that we've created are free and we are still building our audience.
- » HW advance is not matched to what user's expectations.
- » It depends -- for VR, although adoption rate is increasing, it still takes a lot of resources to make a genuinely good VR game. AR is likely on the same table since people barely ever want to pay for mobile apps, assuming this will be a mobile-AR landscape first before it is widely adopted as standalone devices.

NEVER

- » VR has already hit peak pickup, AR/MR has yet to be proven outside of enthusiast crowds
- » Educational

N/A - PROJECT NOT TIED TO PROFITABILITY

- » This is part of the ongoing CPG Client Engagement in Learning Space
- » Not appropriate to pull AR/VR/MR out as a standalone idea. Already profitable as part of larger ecosystem of platforms.
- » Government project
- » VR mirrors the history of the computer mouse. Initially, most people did not have a use for a mouse. VR needs a spark to push it into the mainstream. And that can happen at any time. It is foolish to try and predict this.
- » Interested in AR/VR/MR for the transmission of embodied wisdom, particularly in Climate vulnerable communities. Interested in the technology for the power of communicating forms of presence, storytelling, embodied and non-verbal forms.

- » Art/research project
- » primary research
- » All current commercial applications seem to be too invasive
- » It is academic research
- » I'm doing low-cost, self-funded projects to promote environmental awareness. I'm concerned about effect more than profit.
- » It comes out of a marketing or training budget, not for purchase

In the long term, which do you believe will eventually win the greatest market share, and why?

AR

- » A large number of people have difficulty tolerating VR environments, VR products have a longer time to market and VR devices are cumbersome and still tethered. At this time, AR products are easier to get in front of people (more people with cell phones than VR headsets) and the development cycle can be much shorter.
- » A sufficiently advanced AR display could reasonably do all of the things a VR display does.
- » A.R. will eventual replace mobile as the dominant communication and computing platform
- » access
- » Accessibility and portability.
- » Advertising. Also I think the two will pretty much be merged.
- » Although I like VR, I think that our consumers will be looking for an experience that is not exclusively tied to entertainment and more for educational or information purposes which AR seems more flexible for.
- » Applicability
- » AR actually has real world application such as assisting with day to day tasks
- » AR allows mixed reality experiences. The singular reality provided by VR limits the range of applications it is useful for. ARs longevity will be enabled through simulation, training, and operations use in a large variety of complex tasks and environments
- » AR applies continuously and blends into real-life experiences, so no active decision for full immersion required.
- » AR can be applied anywhere, VR can't. VR will still have a market to thrive though.
- » AR can integrate into our lives in real-time. VR is interesting but highly modal and awkward, and needs many massive advances in order to be enjoyable for a mainstream audience.
- » AR can ultimately be used to add functionality to existing products you already use. AR will "Augment" your daily life while essentially running in the background. VR will have a more defined existence that will focus on removing yourself from reality, meaning you will also have to focus on it and dedicate time to VR. To put it simply AR can help you as you drive to work, you would have to pull over to use VR.
- » AR doesn't cut you out from the real world and because of that, in a day to day basis, it has much more potential to be used by the mass market (when the tech gets to a more affordable and easier to use package). In a few years time, it has the potential to be used as a smartphone device that relays information to its users in a very quick and convenient way.
- » AR feels more natural then VR.
- » AR fits into your life, while VR takes over your life.
- » AR has a vast amount of utility applications. A good example is the various AR-based measurement apps which are now pretty much dead since Apple included the functionality in iOS12. And of course, equipment for handheld AR is in everyone's pocket, while getting into VR means that a user must make a conscious decision to invest in it. It's not necessarily as much about the price point as it is about having to go buy the extra HW, having to think where to store it, etc etc. VR has its uses; deep immersion is good in many applications - not least games - but it's also quite isolating. And it's inherently not mobile: you can't use it when walking around.
- » AR has less friction to experience than VR. Has more surface area for possible experiences.

- » AR has true mobility potential because it is developed for (1) future (2) real-world interaction. While VR also has unique applications, early hype has led to unreasonable expectations that are not yet prevalent for AR. VR is also perceived as arising from gaming, while the perception of AR is being crafted to better encompass productivity. So AR currently retains "not yet over-hyped" and "not yet over pigeon-holed" advantages over VR. If this continues, AR will have opportunity to develop in its own right and opportunity to be "extended" into MR/XR as an "opaque variant".
- » AR has way more practical applications
- » AR helps us learn about the world around us in an interactive way.
- » AR is a less isolating technology and if real-world AR like Google Glass were done properly AR could be used in many more situations.
- » AR is for everyday, for life.
- » AR is going to elevate the real world, which will have more applications than VR which has a limit because we are out of the real world.
- » AR is more applicable to every-day life.
- » AR is more practical. People already are using apps that utilize OpenCV frameworks. Snapchat for instance is one of the most well-known use cases that is widely used. It can recognize the human face and add fun behaviours. Enhancing every-day life and sharing information. VR on the other hand hides the world from your view. It is still a bit tedious to put a headset on and take it off. Once that becomes streamline and not as heavy and irritating to take on/off, then VR will provide a seamless transition into worlds and experiences that allow people to escape every day life.
- » AR is more tied to the social world. People get VR fatigue. VR will always be popular for what it can do but AR will simply become part of life in many domains (& it already is a part of daily life for many in the Global North)
- » AR is rooted in reality, I have 20 years experience. VR is niche and being led down the wrong route by facebook and htc
- » AR just has so many more applications than VR. The loss of vision to the real world is a big problem inherent to VR, but not AR.
- » AR looks like it has more enterprise options, particularly when it comes to training. I don't think that VR will go away, but I can see a lot more immediate applications in the non-entertainment space for AR than VR.
- » AR makes augmented content easy to access because users are able to engage with AR via their mobile devices or headsets. It's also less of a commitment and less socially isolating. However, I believe AR and VR can solve very different problems. The experiences and user needs will likely be different too. I don't think it's fair to compare AR to VR when it comes to market share (unless a creator is interested in the area that would lead to most users, most money). The thing that's most interesting to me as an immersive computing enthusiast is which form factors are doing really well in each of those areas and why. :)
- » AR simply has more applications and better portability. While VR can create great experiences or allow for amazing demonstrations, but it requires a preplanned space.
- » AR still keep you connected to the real world.
- » AR will be the dominate use case for most people. However for entertainment purposes VR will be the premium option.
- » AR will become essential to daily life in the next decade, while VR will be more focused on entertainment and therefore will be an optional medium for most people.
- » AR will eventually be embedded everywhere in everyday things and ever present whereas VR is still something you choose to engage with. The lines between the two will blur though.
- » AR will eventually come to more consumer-specific devices than VR, and as a result, will organically increase in market share as both technologies mature in 7-10 years.
- » AR will have a greater market share but VR has a definite place and will be huge nevertheless
- » AR will have more sex appeal. The big winner will be a hybrid approach
- » AR, but not because VR won't be popular. I just think that AR will be something people carry around with them at all times and VR will be something you plug into. Similar to our current relationships with our cell phones vs console and PC gaming. There will be both

- » AR, in a general sense, is the evolution of VR to include the "outside" world. HOWEVER, VR experiences will continue to exist on AR devices (at least wearable ones)! It makes sense that AR will become MR (mixed-reality) or XR (an umbrella term).
- » AR, in the way I see it at least, fits into and enhances what you do everyday. Conversely, VR represents an escape from the everyday. In only the worst dystopian realization of the technology do I see escape being more common than everyday interactions.
- » AR. Because it does not need much external components like VR. Just phones and many people have them.
- » AR/MR provides a wider range of possible experiences, multi-participant, no special HW.
- » As headset features converge they will look more like AR headsets.
- » Augmented reality is probably the best format for people on the go or that will be using the technology while doing a separate activity or integrated with other technologically based activity.
- » Availability of consumer hardware. Portability. Ease of use. AR content flow into user's daily activities, instead of inserting a user into a VR world.
- » Available on more existing consumer devices.
- » Because AR will be more efficient. It will make life easier to people while vr will be more geared towards entertainment
- » Because it makes it easier to people to use the technology. Uses cases are also broader.
- » Because people will want to interact and see each other.
- » Because the path to the customer is easier
- » Because you don't need a headset. VR is limited by equipment
- » Blended AR & VR sessions. Hopefully VR will get carried into the AR ecosystem, via glasses/HMD's that support opaque to transparent "blended" sessions.
- » Both actually.
- » Broader consumer base.
- » can use it in the real world
- » Close to the real world would create more opportunities in a large scale
- » Completely blocking out vision from the real world is great for games, but when it comes to long term, business solutions will win the greatest market share. For example, seeing what a room decorated with furniture will look like as you are walking through a house that is for sale.
- » Content development costs are less. Much broader use cases and more vertical use cases possible.
- » Convenience. Same reason people watch TV on the phone even though they have a 60 inch flatscreen at home.
- » Despite the temptation of indulging oneself into the VR world, the society would not be possible to operate purely in VR. AR presents a more feasible balance between the technology romance and realistic life experience.
- » Due to enterprise applications
- » Ease of use and ability to use while staying aware of the real world.
- » Easier accessibility and wider audience reach
- » Easier appeal to mass market, less need for setup.
- » Everyone already has the tools in their pockets.
- » Everyone asks this like it's a 0-sum game. Like AR and VR must compete head-to-head in each market segment. That's false. 1) there's room for both, 2) the right choice for a given project is task/outcome dependent, not based on market positions.
- » Extended reality will quickly become the aspiration with AR being quickly attainable,
- » flexibility, we are only seeing the very basic possibilities of AR, give it 3 years.
- » Greatest potential adoption
- » hard to compete with reality but easy to complement it.
- » Headsets not required
- » I believe both have there places VR home but with a more availability to AR due to immersing real world and virtual together
- » I believe AR can ultimately replace the smart phone when it becomes an accessory that isn't cumbersome. It provides everything that the smartphone can provide and utilise world information to enrich experiences.

- » I believe in MR, smaller eyepieces will appear with greater efficiency, which people can use on the street with great convenience connected to their cell phones
- » I believe that AR offers more versatility of use.
- » I believe that the blending of AR with the real world is much more appealing to the average user, and there is less potential for motion sickness.
- » I don't really like this question, I think AR/MR/VR/XR are complementary
- » I hate being asked this question. From the long term perspective, it's like asking 'which is a better industry to be in; travel or hospitality?' They're two sides of a similar/related XR coin... with overlapping technologies and developers, but different uses & markets (and some similar). Both will become deeply interwoven into our lives; for entertainment, medical, industrial, commercial, etc. AR will almost definitely become a more prevalent facet of our lives for shopping, working, educating, communications, etc, etc and VR will grow beyond all expectations in both related and its own sectors. All that said, the necessity for education in and hiring for AR development will very likely exceed VR development.
- » I haven't seen one yet, but I believe one or a few killer "helps with life" AR apps will generate a lot of attention and adoption.
- » I picture a more immersive, almost "VR-like" AR experience.... closed lens kinda stuffs...
- » I think price and integration into everyday life is important. AR offers just in time filters for information that can be both entertaining and educational.
- » Inevitably the fact that AR can be used day to day in a way that may not effect your interactions will make it more popular
- » Integration with the real world seems more applicable,relatable, and more comforting to most than VR. Though, I think AR will take a while to catch on due to it being more expensive than VR at the moment.
- » Is less invasive and more conducive to multitasking.
- » it is less invasive on the player/user
- » It just has a little more functionality for every day living.
- » It will be built into the very fabric of life itself. Phones will be obsolete. Glasses and then contacts and implants will allow everyone to live in an enhanced reality.
- » It will be integrated with everyday tasks and be more readily accessible.
- » It will be the day to day interface replacing mobile phones. VR will likely be the same device but will be used when you are in a secure environment such as a home or office and want full immersion.
- » It's more accessible.
- » Just as we know
- » Larger ceiling for global users
- » Larger existing user base of hardware. Easier to implement the tech into other, existing experiences.
- » Larger use base More easy to adopt, no needs for larger structures
- » less problems, more devices
- » less technical barrier to entry, content can be passive, enterprise and visualization markets are bigger
- » Loaded question, they aren't symmetrical technologies...
- » Location based AR and MR data will be ubiquitous as soon as the threshold for seeing it in a natural, unobtrusive way is significantly lowered. VR, with it's physical threshold of having to immerse oneself and shut oneself out from one's surroundings, is more similar to reading a book. Both are viable mediums, but very different.
- » Lower barrier of entry for consumer because they already have cell phones that support AR. Anyone who uses a snapchat or IG filter has probably already used AR. The same can't be said about VR
- » Lower friction in AR
- » Mainstream audience doesn't want to be hindered by clunky headsets.
- » Many phones already represent a huge AR market; even if VR produces more profit per user (which I suspect will be the case), I expect AR will continue to have one or more orders of magnitude more users than VR for many years to come.
- » Marketing and advertising
- » Medicine will see the most use for AR
- » More applications. VR is really a subset of AR in a sense.

- » More everyday uses with a long term potential of replacing the smartphone.
- » More immersive and handy
- » More mobility and availability among different price ranges for consumers. Easy to pick up and put down with minimal investment.
- » more practical solutions for multi industry purposes.
- » More practical use cases. Although VR will have a few powerful Niches
- » more social and practical
- » More social, and its inherent ability to be used/played in the realworld rather than locked away in a dark room.
- » more ubiquitous applications throughout the world
- » More useful
- » More utility outside of entertainment, so a bigger potential player base
- » More versatility, wider market
- » Most time is in the real space so vr can only be watched a certain number of hours a day. Ar more life usable.
- » MR will win we cannot have either, we need to have both
- » Naysayers and skeptics will gravitate toward AR. VR will win a strong niche market share.
- » Neither. Both require people to put crap on their heads and the experience they'll get won't be worth the effort. See 3DTV's failure as an example
- » Neither.(Survey Monkey would not allow me to not pick an option). In the long term AR will blend with VR and various forms of MR will be the standard.
- » Not really sure actually but I think despite VR's popularity at the moment, AR is quietly doing its thing and much more useful for a lot more flexible situations in a more integrated way, so might win out in the end, especially if VR doesn't get as widely adopted (everyone has phones with AR capability but not everyone's going to want a VR headset)
- » People prefer mixed experiences that do not fully destroy their physical presence.
- » People seem to want to still be in control of their physical environment and when you can combine the virtual with the real world, it wins.
- » Personally, I'm more interested in VR as an artform, but I think AR will have a wider array of potential applications for different industries. Education, health care, product support, etc.
- » Please. Facebook:WorldofWarcraft::AR:VR There is no contest that layering the digital onto our real world has more practical and impractical applications than escapism and isolation.
- » Practical and more marketable applications
- » Question is wrong. AR & VR don't have the same possibilities and although some content types can be on both technologies, they each have their specificities influencing what kind of products can be designed for them. AR & VR will compete on some markets but most markets will be irrelevant to one or the other.
- » Rather MR. Our target is in new training environments so that we can support learner while acting in VR.
- » So far the devices for AR (especially HMDs) are not so comfortable, heavy, too hot, and it seems it takes a certain amount of time to solve the problem. Along with that problems, the price of a device is also still not so feasible. I guess within some months or a year, there may be notable advancements.
- » Some future version of Facebook will be on all the time which will be ar. Many more people use Google maps/wayz than use any vr, print that on your face is bound to happen, I think.
- » Technology penetration
- » the reason we feel that MR/AR will be a larger share is due to industrial and personal. Where VR is more home based. We do prefer the term XR because it is easier to explain the differences.
- » The ability to mix the real and virtual (and do it well) will be truly groundbreaking across many fields.
- » The cellular technology is of massive use, and less expensive to acquire.
- » The tech will continue to grow, evolve and miniaturise, and AR is a more friction-free means to experience virtual spaces
- » there won't be one or the other..
- » They will be blended and combined.

- » Think replace smart phones with smart glasses, work and everyday world interactions. VR will be exclusively for escapism such as games and movies with friends
- » This is a loaded question, "in the long term" these concepts will merge into one.
- » This is a silly question. Long term there's no difference. It's like asking someone if a monitor is a full screen monitor or a window mode monitor. Just silly.
- » This question is short sighted, the line between the two will continue to blur
- » Too many real world applications to ignore; persistent companion ui, personal agent presence, group communications, RL navigation indicators - the list just goes on. VR is great, but full immersion is often unnecessary (or even undesirable).
- » Tough call. Both will be extremely useful, VR will more likely be used for simulations while AR will more likely be used for bringing digital information to a real scenario.
- » Truly successful technology platforms are social. Interaction is key and you just can't get that level of interaction inside the headset. I think the future of XR will be the virtual world overlaid onto our real world.
- » Ultimately irrelevant b/c eventually AR and VR will be one hardware device with two different use cases
- » Until VR can match the amount of cellphones in the world, AR has will continue to hold the greater market share.
- » Usability: Easier to overcome issue specific to VR such as nausea disorientation. Interaction with real world environment is more attractive and affords broader application such as map systems, identification of real word objects, locations, people, language translation.
- » Use cases might justify users to pay for apps
- » Using AR for informational purposes makes for engaging information, but also is more effective for training because viewers see the real world with augmented visuals ovetop, providing for memory training / easy reference.
- » VR and AR headsets will become a single piece of hardware and they would be like laptops and PCs. AR will be used in daily life.
- » VR involves cutting yourself away from the real world, which has numerous low desirable side effects.
- » VR is a niche and the threshold of entry is still too high. Eventually (5+ years) AR will replace the mobile phone screen and our environment will change to better support AR features.
- » VR is an amazing format but if AR gets to the right level it could be like a smartphone in that everyone uses it.
- » VR is limited to a very small target group, while AR is applicable everywhere in real live situations. It will become a regular part of everyday live.
- » VR is not practical for casual users for many reasons.
- » VR is too weird for most people
- » VR is ultimately a subset of AR
- » VR requires too many barriers to entry (high cost of equipment, cords required), whereas AR can be integrated in many different ways and doesn't REQUIRE any hardware but can use hardware if warranted.
- » VR short term, but as tech becomes more available and affordable, I feel AR in the business environment will outweigh VR overall. I think VR will always be the consumer go to.
- » VR's isolation factor limits its use
- » We don't like headsets, even for audio
- » Wearable AR probably replace smart phones eventually = huge market. That's a LONG ways off though to very high form factor and battery life requirements. The former will solve itself over time with miniaturization (in say 10 years time), the later I don't understand well enough to guess.
- » Wearables
- » Wearing a headset is restrictive. Having device-free AR (whole-room AR) is the long-term customer desire.
- » Wider application and safer to consumers operating in a non-controlled environment.
- » Wider array of devices available to support a broader market and applications
- » Wider exposure.
- » Will affect more of what we do.

VR

- » "Neither" Immersive Technology Market has been around for years... AR/VR are strictly HARDWARE Focused... start looking at the end game... solutions!
- » There should be a third option: Neither. Market share will be close to equal. They are not either/or technologies. There's a time/place/purpose for each, thus they are not competitive but complementary. Only the press likes pitting AR vs VR. It falls upon those of us in the industry, actual practitioners, to persistently educate.
- » Actually, I think both will do well. Originally, I thought AR was a waste of time, but new developers have come with products that show real potential such as the AR Star Wars game. The only difficulty I foresee is the cost associated with the gear that works best. When the cost is reduced, then that will help to open the market to more people and professions.
- » Again, this is akin to the, "mouse market." I think both are too small to really be worried about comparing the two.
- » AR is fun but not sustainable in its current state. VR however provides numerous options and road map features that will provide real solutions that will integrate into everyday lives.
- » AR is very niche, UNTIL you can put something on your face and not have to hold up a phone (ie: mixed reality glasses). VR is more mainstream than pure AR.
- » AR will be dominant in the short term and will continue to grow but VR has the potential to become the platform of choice for next generation consumer software
- » Ar->industrial applications Vr->Videogaming
- » Because VR will be able to charge more than AR
- » Cheaper for now
- » From startup perspectives, AR is probably not for them because killer apps for AR would eventually become part of set of big companies' product new features only, for instance, Amazon. Yet for VR there are many niche markets to be developed.
- » Full immersion is key to unique experiences.
- » greater immersion
- » Greatest immersion
- » I believe VR can be more immersive and create experiences that people are more willing to pay for. I believe AR may struggle to be as monetizeable because it's adding more of a 'layer' than a full 'experience'.
- » I believe VR will be more exciting to the end user than AR, but both will have strong applications for use.
- » I don't know if it is an accurate question. Most likely AR and VR will converge in one device, making the VR/AR "battle" moot
- » I don't believe there are going to be as many differentiators in the long run. There are already a ton of VR headsets with passthrough video capabilities and this will only get better and more useful. I say VR because in order to place objects that are dark over scenes, you currently have to be looking at a screen that is compositing both the real life and virtual objects on it, and that's more like the current Vive Pro with camera passthrough than a pair of glasses where you are actually seeing the real world with your own eyes and having other graphics projected over that. It will only be max 10 years before smaller lighter mobile devices than we have now can do what the current Vive Pro is capable of and probably more.
- » I feel this is because it would allow users to become more immersed in what ever it is they are doing especially if in the future it allowed for touch sensitive peripherals.
- » I make VR training apps for the airforce. They want to use to VR to bring learners to places that are expensive or physically impossible to go to IRL.
- » I think AR currently is winning the market share because you can use it in your current device. But as VR goggles/visors get cheaper and developers create more immersive experiences I feel that it will balance out to over take AR. That movie Ready Player One is becoming a reality faster than people think.
- » I think both but virtual reality has more interaction
- » I think both will have wide market share.
- » I think the two technologies will become closer and closer bedfellows as time goes on, until the point where AR/VR experiences blend seamlessly based on the needs of the user. However, VR provides the benefit of not requiring physical space, which means it may become a better venue for day-to-day work and entertainment.

- » immersive
- » immersive nature of engagement
- » In my opinion VR is a way to escape the problems of the world, and with the troubles people have today, who wants AR?
- » internet and many real world services and products will be inside a VR world
- » It depends, but I'm mostly leaning toward VR, because of the fact that everyone has a phone you could say AR is the way but phones are limited in terms of space and the quality of the graphics. VR has the graphics users would usually expect from that platform, but you are limited by the power of a graphics card. Since VR manufacturers are coming out with wireless headsets, you have the freedom of movement, similar graphic quality, and the convenience of phone size console.
- » It is full immersion, a complete escape.
- » It's the real new immersive media
- » Long term AR and VR will converge. Until then, AR because of cell phone ubiquitousness.
- » More immersive platform that can make people feel as if they're anywhere. Eventually work and fun will be more easily done in VR and remotely.
- » More immersive within a fictional reality which is the reason people want to escape their current one.
- » More involved experience
- » More like XR, immersive experience is still preferred for my work, but AR looks to be pay bills for many.
- » more options for gaming currently with VR
- » more use cases, less technical complexity
- » MR
- » People always want to escape to somewhere else. Escapism is what gamers love
- » Probably VR w/AR cameras; once the image quality is high enough. Some experiences are best in VR (where you don't want to see current environment) and others are best if you can augment (but hi-res cameras are probably good enough for most scenarios).
- » profitability will follow the best gaming platform and VR is a better for gaming.
- » Since I can't click both, I'll explain....both will have their very own specific uses and markets, despite the many commonalities there are times when you want complete immersion (VR) and times that you want overlay (AR) and picking one over the other is silly and short sighted. They both have their own markets.
- » This is a difficult question because of the fuzzy nature of "long term". I think over the next 10 years, VR will be more profitable than AR, and then AR will overtake it.
- » This is an artificial distinction. VR is AR because you can't easily do away with gravity and physics. Better to concentrate on what modalities are needed to create the desired effect on the participants.
- » This is another misleading question, since AR and VR are converging where headsets are concerned. So my answer is both. "Eventually" is too broad. I would segment from 1-5 years and 5+ years for timeframe.
- » This question doesn't really make sense. I think AR will eventually be a subset of VR, but these two aren't in competition with each other because they work in different contexts.
- » VR is more engaging and lets you be somewhere else and allows for more immersive experiences.
- » VR is the most powerful new medium ever. It will eventually replace television as the world's dominant mass medium. VR has a profound effect on the brain and subconscious, including the ability to increase people's capacity for empathy.
- » When VR/MR becomes truly & fully dimensional without the need for goggles it will be the only model and AR will fold into it. AR is the introductory phase.
- » You cannot change the surrounding environment with A/R.

What have been the most significant missed opportunities in the AR/VR/MR market to date?

- » 2011 instead of evolving low field of view HMDs (which had 4K prototypes in 100 g form factors) everyone backed FOV2GOVR
- » 6dof on mobile to drive adoption
- » A killer game app that sells headsets.
- » A preoccupation with zombies.

- » A real game changing application / game A new (old) concept of MR/VR arcades (more social, multiplayer experience oriented) A real application use case for manufacturing and other field engineering
- » a unified approach
- » accessibility
- » Accessibility. The technology is still not as widely utilized across industries as other technologies, i.e PCs or mobile phones.
- » Accurately communicating the experience of using VR to consumers.
- » Affordable AR glasses that have practical day to day value.
- » Alignment of devices / formats / technologies
- » All things education.
- » Applications of the technology that truly appeal to people in their everyday lives and make their lives easier
- » Apps for low end equipment
- » AR advertising
- » AR for pilots/military/industrial applications, etc.
- » AR headsets are taking longer than expected.
- » architecture / real estate.
- » ARkit - ARcore
- » Asymmetric games.
- » audio--people say it is half the experience, but they still think of it last when developing and do not use it to the fullest possibility
- » Awareness. People need to be aware that these spaces are out there.
- » bandwidth
- » Better titles at launch of Vive and Oculus
- » Big companies waiting until they think they can make a profit on a fully involved game studio type of experience vs pushing a few people off to create smaller experiences with their technical resources while those merit attention. I think the missed opportunity is giving themselves a longer period of time to consider the differences of VR with traditional 3d gaming. It's more different than the display, and I find it far more similar to the thinking involved in architecture and design, which means those coming from gaming thinking this is merely an offshoot of gaming are not putting out highly considered content.
- » Bigger brands
- » Branded content that is carefully made for VR. There is a lot of money being thrown into VR by brands, but the results are mediocre at best.
- » building strong content base, that keeps user going back to experiences
- » Business applications.
- » Cardboard to sample content to the masses.
- » Cheap light weight glasses.
- » collaboration, hands down..... imagine the output from a "benevolent" superproject.... that's how you get the most stuff done: with cooperation.... I hear there may also be some IoT possibilities.....
- » communications
- » compelling content
- » Connecting interests in various countries to open doors to creative markets
- » Connecting to education (K-12 and higher education)
- » Consolidation
- » Consumer education - AR specifically.
- » Continued investment into VR despite the consumer market not being there (a couple of the GDC 2018 talks touched on this), which results in less PR
- » Convenient
- » Corporate training
- » Cost of entry for participants / consumers
- » Creating an affordable AR headset and platform.

- » Creating AR/VR devices that are affordable right from the beginning.
- » Creating unique experiences that play to the limitations of the devices and consumer's home/personal environment.
- » cross platform functionality
- » Currently those who have worked on this technology have done many things to further it and learn so I'm not sure what it is being missed
- » Customizing products for 3D printing in AR app.
- » cyber security built into the platform
- » Data visualization
- » Defense systems
- » Developing the ideas first in enterprise vs consumer first.
- » Developing unified standards
- » Direct monetization.
- » Don't understand the question
- » Don't know
- » Dual camera / depth of field sensors on mobile devices.
- » Education
- » Education
- » education
- » Education
- » education.
- » Education; user friendly development tools
- » Engineer-driven content and marketing.
- » Enterprise sales
- » entertainment and healthcare
- » Esports
- » Ethical considerations being put before technical or market opportunities. (See below)
- » every game is a gimmiky 30 min side show. Nothing continually draws me back in for consecutive sessions
- » Experiences in AR that truly augment reality not just overlay some graphics that are unaware of the surroundings.
- » Exploring unique experiences impossible anywhere else except in these new mediums instead of trying to recreating experiences that already exist.
- » Factory of the future
- » Failure to understand Enterprise should have been focus
- » Finding compelling entertainment or applications that go beyond novelty. XR is a unique medium that requires its own content format to excel.
- » Fine
- » Fitness
- » Focus on education - how superior VR is for education. We should be as enthusiastic and prolific as China is about getting VR into schools.
- » Focus on entertainment rather than enterprise/business.
- » Focus on game play
- » Focusing on high quality tether-less headsets.
- » following palmer luckey and carmack down the FOV2GVR rabbit hole has taken billions of dollars and time down the wrong direction
- » For us it's design review and manufacturing build
- » For VR the biggest mistake was overhyping the early generation before anyone knew how to build compelling content and the only consumer devices available were overpriced for the (non) existing market. On the other side of the spectrum were cheap Cardboard headsets with poor experiences. This has put VR especially in a bad spot where some consider the tech dead or awful. We would have been

better of with holding the hype train until this year... For AR things are looking much brighter as it's still just portrayed as something you do with your phone. AR still have the hype ahead.

- » Fragmentation
- » funding of platform exclusive experiences denies access to premium software for each platform.
- » Funding, funding, funding - these platforms needs premium content across the project funding spectrum and no company, except Oculus and HTC to a LIMITED extent, want to incur that expense. It's like they ignored failed video game console launches of years past...
- » Game/entertainment due to require expensive powerful machines in order to have a great experience
- » games
- » games, real estate
- » getting to consumers in a simple, accessible way.
- » Google Cardboard - too much to list here, from not including a simple strap, to design your own, to not giving developers an easy way to market their own apps through unity.
- » Google Glass
- » Google glasses, microsoft holoLens. The hardware wasn't good enough for the market. There is niche to fulfill. Full vision mixed device is needed.
- » google glasses, not having a bigger field of view
- » Google glass's PE set us back in the public arena.
- » Greater focus on enterprise applications.
- » Hardware cost
- » Having good, meaningful content to roll out through all the releases of the last year. People buy headsets and often have a novelty experience and then don't go back to them. More money is needed to create real content.
- » Having great products and low cost viewers
- » Health and education guides
- » health prevention/promotion
- » Health services / insurance inclusion
- » healthcare
- » Healthcare
- » healthcare, pain alleviation
- » high quality exclusive content
- » High-end VR systems & headsets that are Mac / iOS compatible; Smartphones with native 360 lenses / cameras
- » HMD vanity and social isolation
- » How to videos that are included with products that explain step-by-step directions for assembly as you are physically assembling the product.
- » HTC Vive and Oculus Rift never had commercials and marketing exposure like the Samsung GearVR had.
- » I can't think of any at the moment. I'm sure even if I considered something to be a missed opportunity, that someone is actually making the opportunity.
- » I don't think opportunities have been missed, but they are developing. Business and industrial training is the biggest untapped opportunity at the moment.
- » I don't think we've missed any big ones yet, but need to leverage small successes to improve the hardware.
- » I guess there has been an abundance of opportunities which simply haven't taken off. Maybe the Playstation VR, initially not being able to produce enough to meet the demand, and even now suffering from the lack of quality controllers (the Move is really a poor man's solution)
- » I think is missing to do more industry focused apps
- » I think the market is still maturing, all the opportunities in the space are still open.
- » I think we don't have a KPI for marketing campaign , we can't measure how those technologies can bring the sales to our Customers
- » I would speculate education. The possibilities for medical training alone is mind boggling.
- » I wouldn't say it's a missed opportunity, but there seems to be a huge potential audience in retirees. Especially in the social VR space.

- » If Apple were to include a Daydream style headset with every iPhone sale that could create a huge market. Likewise Android sales could make Daydream free (I seem to recall it was for some promotions?).
- » If I knew I would have made it
- » If I knew that, I'd be running a business off of it!
- » I'm not sure about "missed" but until the high powered, 6dof setups become wireless and affordable, we're not going to see mass adoption. Until then, there aren't really market opportunities (aside from maybe enterprise uses, but i wouldn't call them "missed" because there are a lot of people working in that space).
- » I'm not sure there are missed opportunities because there are not yet substantial business opportunities.
- » I'm worried about 3 things: 1) an on-ramp for the underground without having to sell out to The Man; 2) playability of titles in the future; 3) a code of ethics.
- » in K-12 education
- » Integration into self-driving vehicles.
- » Intelligent buildings and IOT interaction
- » Interactive/3D web VR has a lot of potential and very few people experimenting with its potential.
- » iOS behind the curve No killer app yet No affordable conspire options
- » It seems right place for the AR. Mainly, they focused on toy things, while in high tech equipment, medical, military, the technique can be applied with enormous possibilities. I know there are already many works are on going, but more focuses are needed.
- » It's a shame that mobile VR hasn't taken off much yet.
- » Killer apps VR was overhyped and created too high expectations
- » Lack of integrated audio in 1st gen VR HMD's. AAA game companies with big R&D budgets sitting out first gen 6DOF VR (Nintendo, EA, Activision).
- » Lack of investment for standardizing platforms and codecs. There are just way too many that, although similar, are all unique or specific to the devices they support.
- » Lack of unification of main vendors
- » land grab instead of focused products
- » Lol, if I knew, why would I tell you?
- » Long form interactive narrative adventures
- » Low cost solutions
- » Low price devices are really limited
- » Lower cost barrier to entry with high fidelity hardware and experiences.
- » Lower price points in the holidays for major brands.
- » Mapping user's actual task process to VR affordances
- » Maps. Heads up driving. Food service.
- » market independent experimentation, unleashing the creative potentials of these platforms
- » market seems to be growing well. just be patient.
- » marketing as a platform on its own
- » Marketing the various platforms has been
- » Marketing to a select number of gamers, techies, early adopters and folks that already want to use.
- » Marketing, community outreach, sales staff training at Best Buy and other retailers.
- » mass market
- » Massively Networked experiences. Social is missing but shared social on a massive scale is needed.
- » Mass-releasing VR too early. The technology has huge potential, but waiting until it's more accessible and higher quality would increase long-term adoption.
- » Mental Health
- » Mixed reality immersive marketing. This is such a huge potential I have trouble wrapping my brain around it.
- » Mobile XR is ripe for development and most developers and marketers in the US are over looking WebXR.

- » More AR based games like Pokémon Go. Focus needs to shift from pure VR.
- » More examples beyond gimmicks with ARCore and ARKit
- » More healthcare opportunities
- » More rhythm based experiences
- » More specifically products new products like photoshop and other types.
- » More VR demo stations that focus on high end HMDs like Rift and Vive
- » Motion controllers in AR
- » MSFT's WinMR devices. They had an affordable, easier to use device that instead of focusing and marketing one, they worked with various OEMs on numerous devices, confusing consumers. They also made the device run around their UWP platform without investing enough to bring good software to the platform.
- » Multi sensory opportunities in haptics, scent, and interaction
- » multiplayer: 1 in vr, many via other screens
- » music concert / live sports viewing
- » Needed to capitalize more on early adopter gamers get very excited so that others are attracted by the profitability to entice them to get engaged into the VR market.
- » networked open world where any company can contribute
- » news stories
- » NGUI
- » No battle mode or trading in Pokemon Go! Also a lack of premium level story focused entertainment that gets 'non-early adopter' consumers interested in the medium.
- » No idea
- » none, someone somewhere has capitalized on the opportunities and they only continue to increase.
- » Non-game experiential applications being pushed at "non-gamer" consumers; things like "be at the high-fashion gala in Paris" or "be backstage with U2", and so forth.
- » Not having a low enough price point to make VR attractive to the average consumer.
- » Not necessarily missed but the learning science seems to be an under-investigated area for AR/VR/MR.
- » Not targeting the applications that are low hanging fruit such as Architecture, Safety Training, and Industrial layout. These applications really fit VR/AR well, but the industry has been slow to push for adoption in those areas.
- » Not targeting the mainstream with any kind of collective agency. People won't want to take a punt on new tech if they don't feel enough control.
- » Not using VR to re-create historical sites
- » Oculus and HTC completely missed many opportunities funding VR content. Sony did a much better job.
- » Oculus and Vive funding better projects
- » Oculus debuted without touch, and that damaged it's reputation by being beyond what most of the market could handle in terms of computing and infrastructure. It did not complement existing tech, it was in conflict with it. Secondly, AR has had a number of pseudo-launches, but has only recently come into its own with support from Apple and Arcore. It currently lacks its own hardware foundation and has yet to be fully integrated into multiple forms of media, beyond a subset of tablets and phones. There has not been a central infrastructure or app for AR that has changed our experience of the tech, and it has been considered a gimmick in most of its applications. Lacking narrative, social dynamics, and hardware flexibility has been the most significant issue facing AR as it has moved forward.
- » Oculus should have not been bought by Facebook. GearVR was a mistake, Mobile VR has turned people away from VR completely.
- » Open and unified sdk for all platforms
- » Other than industrial application or space planning, AR has yet to create a compelling experience in the entertainment space that truly takes advantage of the technology
- » Over focus on bring PC game play into VR instead of building new VR first game play
- » Overfunding of porting Hard Core Console/PC games Underfunding of new innovative XR only experiences Underfunding of women / POC lead teams
- » Overrating VR as it is never reached the customer. Now the people who didn't understand what to do with VR try their luck with AR, even renaming it in XR. It is clear that there is an enormous lack of understanding of customer needs and interests around these people. But this is what they need to learn.

- » Peripherals, and VR/AR arcades.
- » Personalized, guided, interactive shopping.
- » Platform fragmentation.
- » platforms too fragmented. OOTB experience for tethered VR was complex.
- » Plenty of room for engaging language learning experiences.
- » Point of sale
- » Pokemon Go. It was so close to being the final word in pokemon for decades.
- » Popularize AR/VR not as a gaming platform but as a professional one.
- » Price Point has ALWAYS been an issue, and the cost of the tech has done nothing but slow the market down. PSVR removed the cost of the PC and replaced it with the 60 Million devices already existing in people's homes! And the \$200 Oculus Go has been selling out both in stores and online. Plus, there have already been more Oculus Go's distributed in it's first few months then the total amount of Oculus Rift's sold in it's first year. The reason AR has proven to be so much more viable than VR to date is because the main component to view AR has been a Smart Phone, a device BILLIONS of people already own. Mass adoption of XR is going to come from accessibility, not "killer apps!"
- » Production and integration of music for AV/VR format.
- » Professional and college sports, adult entertainment.
- » Proper AI simulation and educational experiences
- » PSVR not getting more serious titles
- » Psychological uses.
- » Push to introduce affordable VR to schools
- » quality content
- » Quality driven AAA games and content. Just experiments.
- » Reaching consumers looking for leisure A/R experience
- » Re-Distribution of standard 3D stereoscopic films.
- » Reflecting on the people who have problems using existing headsets, focusing too much on single use then discard experiences, thinking experience rather than function
- » Releasing the Oculus Rift without a dedicated hand-tracked input device.
- » religious groups/cults
- » RTS, Table Top, VR meetup
- » Saturating actual applications
- » Segregating games into "VR" and "Not VR". VR used to be just a peripheral which regular games could use. Now it seems you can't support both VR and traditional peripherals without getting labelled or sidelined.
- » Simple and useful applications
- » Simple discovery and access to IoT devices. A generic AR interface to registered/authenticated IoT devices would open up reams of possibility to an AR user.
- » Slow down in platform holder funding for content
- » Smaller headsets
- » social
- » Social platforms
- » social/human impact research
- » Sports
- » Standardization
- » Starting with a strong software base before launching hardware.
- » Still in development stage for hardware
- » Still too early to say in my opinion.
- » Surprised how few have tried VR
- » Tech not caught up to hype
- » The education fields, many educational materials can be made interactive, attractive, or realistic.

- » The fact that Oculus Rift did not have the 6DOF controllers at launch.
- » the failure of google glass to get people excited about AR
- » The field of education - primary, secondary, post-secondary. There are so many that can't afford the equipment necessary; the game systems, the gear, etc. We are excluding a significant portion of the population while at the same time we are leaders in technological advancement. The AR/VR/MR market will not survive if the prevailing thought continues - that it is only for serious gamers, indoor adventure parks, and a few apps for tourists.
- » The footrace with platforms, hardware, et al has caused quite a bit of consumer confusion
- » The inability to deliver VR to a larger audience due to price .
- » The industry really needed an HMD like Oculus Go when the hype for VR was at its peak. There has also been a disproportionate focus on developing hardware for VR and AR, and not enough of a focus on developing software to support such a vast hardware ecosystem.
- » The killer desktop/productivity app
- » The Mac market is untapped
- » The massification of applications and games of AR.
- » The most significant missed opportunity is applying VR / AR applications to daily news (not just news documentaries). Getting users to put use XR daily to receive daily information I believe will get users involved with XR technology
- » The Olympics. The World Cup.
- » The opportunity to do make a well designed and complete documentation foto devs. For example, the documentation for Oculus un Unity is basically unexistent.
- » The price point is the biggest threshold for desktop. Hopefully the inside out mobile headsets will take off because of ease of access and price.
- » The user interface is horrible - we need to make it more seamless to interact
- » The world is not ready, nothing is missed.
- » There are only a handful of sports training organizations who now have a stranglehold on the market thanks to limited competition.
- » This refer to, mostly, my geographical location: Games, Education and Health industries.
- » Too early to comment
- » Too early. Tech isn't good enough, experience isn't easy, tech too expensive
- » Too many closed-walled ecosystems - especially between Vive and Oculus.
- » Tourism
- » Training
- » training
- » Training
- » Training Apps
- » Training apps and experiences
- » Training hasn't barely been explored and is huge opportunity
- » Training videos
- » Transformation of the travel industry, horizontal use cases for AR and in general moving AR use cases past measuring apps, shopping and entertainment.
- » Travel
- » Travel & Transportation industry I think has missed the bus already in AR/VR/MR market. Learning / Training is another big area of missed opportunities
- » Tripple A exclusive game titles that could shift the market interest into the VR market. AR is still too expensive, but VR is already viable as some major publishers are beginning to dabble in it.
- » Truly immersive sound which my company is going to launch a new product to solve this problem within this year.
- » Universal standards for developers.
- » until more original content is ready for the platforms, access to classic games should be readily available. Also the fact that, education could benefit more with XR, such as digital classes and teachers lecturing about topics that had to be removed due to the cost of the supplies, students can do hands-on training.

- » Use for the average home owner to plan for changes; i.e renovations and furniture purchases.
- » User interactions. I feel that a lot of companies are using AR and VR more as gimmicks and not really asking the general population what their pain points are. Also AR in automotive design. Cars were some of the first industries to use AR with backup cameras, a huge missed opportunity would be AR on the windshield.
- » Using older game brands that could boost the AR/VR/MR market.
- » various
- » Video streaming of live sport, culture and politics events
- » Visibility of it's successes
- » Vive Pro. Could've been a much bigger update, incorporating solutions to first gen VR on a large scale, but it only upped the resolution with a really expensive HMD. We needed a bigger leap in VR.
- » Vr In the classroom. there are efforts, but not aggressive enough.
- » VR shopping
- » Vr used in theaters for movie experiences.
- » VR: Bio/Medical VR: Sport VR -e.g. Reha Games AR: Museum & Education - make things visible (Pollution Biology etc.)
- » Wayfinding. Mapping done well could gain a billion AR users at a stroke.
- » We don't know yet. But XR for education & industrial training are certainly under-funded.
- » We have not done the correct way to explain what XR is. so the consumer has no idea what we are talking about. We need to tell a better story on what is what, and why this is really what you are looking for
- » We keep focusing on the hardware side of the market... we need to focus on the fact that these are just and INTERFACE to the content / services. This is the most significant missed opportunity that will finally lead to a "Reality" check on the market.
- » What market?
- » Wireless AR
- » Your questionnaire reinforces my previous statement. All ARE developing, along with standards, open source, developer communities. Cross-platform plus's and minus's are debatable at this point

What is the biggest unsolved technology or design problem in making AR/VR/MR experiences?

- » 3D films without motion sickness
- » 5G & battery life
- » 6 DOF standalone headsets that are MR capable with real-time room tracking features. This is the biggest barrier to mass consumption by consumers.
- » 6dof live action cinematography
- » Ability to read and write text comfortably and quickly.
- » accessibility
- » Accessibility
- » Accessibility
- » accessibility to VR cameras and consoles
- » accessible, cheap and easy to use
- » accuracy and resolution.
- » Achieve the maximum image quality in the VR equipment, without drastically increasing the final costs of the equipment.
- » Adoption to Mobile technologies
- » Affordable headsets of high quality
- » affordable platform development

- » Allowing for streamed, untethered 6DOF VR that doesn't require a major hardware investment. 5G streaming tech with offsite rendering and the upcoming mobile chipsets seem to have high potential for solving this issue.
- » Anything that goes on the face will need to account for makeup. Anything that is shared between people needs to account for diseases spreading.
- » AR - Displaying dark objects over reality. VR - More plug and play, too many technical hassles outside of just creating or interacting with content. VR - Better field of view/area of tracking for controllers and headsets for everything but the Vive. Losing tracking of a controller when you raise, lower, or move your arm behind you for Windows MR and other camera tracked controllers, as well as things like Leap Motion. It's aggravating, unintuitive, and will either push people away from VR, or force them to use unnatural movements that would merit calling these devices "constrained reality". Someone seeing a demo in a museum and gets excited about VR and goes out and buys a Google Daydream or anything with less capabilities than a Vive or even a Rift are going to be disappointed. They may still find a use for the device, but it's a bit of a bait and switch calling them both VR. AR & VR - Haptics or other ways of making control without controllers intuitive and satisfying.
- » AR - enough portable compute to make an on-the-go AR experience seamless.
- » AR -> hands-free operations via glasses VR -> cables, cables, cables -> technology setup too complex MR -> sensory capabilities and FOV
- » AR cloud
- » AR display tech
- » AR FoV
- » AR Glasses
- » AR glasses need dynamic matting so that images are not transparent
- » AR: depth of focus mismatch between real world and digital objects
- » Ar->lack of Hyper accurate tracking Vr->large space physical movement
- » AR-cloud related issues for AR.
- » Artificial locomotion
- » As a VR filmmaker, the biggest problems are limitations in camera hardware technology, stitching software technology, and headset display resolution.
- » Attractive, unobtrusive, wireless hardware that seamlessly integrates into our lives, like glasses.
- » batteries
- » battery life
- » Battery life and latency
- » Battery life combined with overheating on mobile headsets.
- » Battery life. It's way too short for any of the standalone devices, turning people off to the possibility of getting a headset.
- » Battery technology is holding hardware back, but from a design perspective, the (understandable) desire to co-opt video game traversal design is backing experiences into an unwinnable locomotion problem. There is so much we can do inside a single room, translating the player across a giant world seems like the wrong place to start.
- » battery, wireless power
- » Being able to sell the product without being hands on is a huge issue. With VR in particular, the player cannot truly understand
- » Better haptics? Honestly getting the answer to this question is part of why I am interested in this conference!
- » Bigger FOV for AR
- » Body/foot tracking & locomotion. Lots of great options but we aren't there yet.
- » Building high fidelity hardware that's easy to create profitable content for.
- » Bulky headset
- » cables
- » Cables.
- » Cheap light weight glasses.

- » cheap lightweight computational transparent displays
- » cheap products, no professional gadgets for a price of a very expensive graphic card
- » Classes
- » Clunkiness of AR gear. It is too conspicuous to wear daily and in public
- » Collision capability.
- » comfort accurate tracking resolution
- » Comfort and price
- » Comfort/long-term wearability
- » Common standardized hardware devices that can be used over various software platforms.
- » Complete decoding of human sensors and reverse-engineer such sensors to achieve perfectly synchronized human-computer interaction.
- » Comprehensive tracking of the physical world.
- » consistency and ubiquity, experiences need to run consistently on different platforms and there need to be a lot more devices in the hands of consumers.
- » Convenience
- » Convenience and approachability.
- » Cost
- » cost and adoption for vr
- » cost of technology
- » Cost, immersion, rendering, and haptics.
- » Cost, weight, untethered.
- » Creating a standardized control scheme or base, not just for movement but interactivity as well
- » cross platform functionality
- » Cross-platform compatibility whilst changing hardware
- » culling virtual object correctly to match the real environment, lighting issues
- » design / ux for hardware. accessibility design true to the medium
- » Devices being smaller and more comfortable to wear.
- » display resolution and long-wear comfort
- » Distributing content without cardboard only gives s very few access
- » Dizziness
- » Download speed
- » Ease of access, ease of getting in and out. Oculus Go solves a lot of this, but that's a mobile headset, and very limited.
- » Ease of use, ergonomics, higher fidelity... the best content matters little if the user is succumbed to a complicated setup, a sweaty heavy HMD, a screen-door effect... etc.
- » Easy conversion between AR and VR content with the same device; sensing body parts in VR with high accuracy, low latency, and minimal additional hardware
- » Elongated battery life for devices. Making them useful more more than 3-5 hours at a time without having a large form factor.
- » Embodiment still has a ways to go
- » engaging curiosity, imagination and person's sense of self
- » enterprise model, affordability and content
- » Ergonomics, comfort, at least for HMDs. As much as they have improved, it's still a fair amount of effort to put on an HMD, and it can be uncomfortable and too hot.
- » eSports in VR
- » Everyone is looking for higher framerates and pixel counts, but our hardware can't compute those scene yet.
- » Experience can be outdone by your body and senses not liking being immersed.
- » Far too many to list. Very difficult to prioritize. AR (especially with regard to tracking & displays) has a long way to go, obviously... but it's also much more complicated. VR HMDs will/must evolve immensely. Haptics and 'Presence'-facilitating technologies will play a HUGE role in expanding immersion... eventually.

- » Fast and lightweight wireless for VR.
- » Feeling like you are actually controlling it without actually feeling like it is a gimmicky AR/VR experience.
- » Field of view
- » Field of View - Powerful but untethered.
- » Finding sustainable solutions to common implementations
- » For AR, battery life of mobile devices and integration into mobile functions (auto launch without needing to launch an app). For VR, portability and fashionable design.
- » For VR - Design: Natural, intuitive locomotion. Tech: Foveated rendering.
- » For VR it is simplifying the set-up process. Ideally, the headset would dynamically generate a mesh of the environment to be used for chaperone systems. This would eliminate much of the setup process, allowing for easier deployment in different locations. The tech is here, but has been used in that manner. A good all in one headset with two positionally tracked controllers would be a huge boon for training applications. The Lenovo Mirage is close especially after turning off the movement restrictions, but it needs a chaperone system and 6dof controllers. AR has a number of hurdles to reaching consumer viability: FOV, variable opacity, variable focal depth, world registration, hand tracking and or 6 dof controllers, mobile processing power and battery life.
- » For VR locomotion is the biggest issue. Hand/head interaction works and will keep improving but moving around in VR without losing immersion or VR-sickness is still a challenge. Unless you play location based VR.
- » For VR, it is the length of time a user is comfortable using the headset. I found that the Daydream's comfort headset beats all the others being wireless and comfortable on the face. This allows for prolonged use at more than 1-2 hours at a time.
- » For what I'm doing, lack of adoption--which is partly a design issue (awkward, slow, expensive, confusing for average user) and partly a social barrier (people aren't aware of the technology and haven't incorporated it into their lives because it's mostly a gimmick at this point).
- » Form factor
- » Form Factor
- » Form factor - plying an ar / mr game through the phone is still just looking at the phone, and ar headsets are still very much hobbieist tech
- » Form factor, compute and energy drain balance for AR glasses.
- » Form-factor for VR googles - Too big, too expensive, too tethered to mothership
- » FOV
- » FOV
- » Frame rate - but it's getting better
- » From an audio perspective the use of spatial audio is still like the wild west.
- » Full body presence and tactile/haptic feedback. Scent, but this one is not sorely needed yet.
- » Full body tracking for proper IK. Currently its just a lot of guess work. Will be soon though now that AI can use simple cameras to calculate human main bone structure. As soon as lighthouses or oculus cams get a small doing full body accurate IK will be easily solved.
- » Full human body interaction - not only tracking limbs, eyes, etc. but the immersion of smell and touch (having the player feel like something is touching THEM or a sensation sandpaper texture vs. smooth)
- » games in VR as interventions
- » generating VR/MR without the need for encumbering gear
- » Getting AR to the mass market is the largest unsolved problem in both technology and design. Whichever product solves this is going to dominate the future technology landscape.
- » Getting consumers to understand without putting the headset on.
- » getting good wearable MR glasses
- » getting rid of the wires
- » Getting the tech in front of people.
- » Getting to a sustainable metaverse.
- » Giving consumers (beyond hardcore enthusiast) a 'need' to want to put devices into HMD or have dedicated devices

- » Glass is limited for sharing experience
- » Goggle size and comfort
- » Good systems for multi-person experiences that are embodied. And this connects with the need for haptic solutions that are not incredibly cumbersome or requires a long winded dressing up process. (These solutions are coming!)
- » Good tools for designers, artists and consumers to build interactive AR/VR experiences do not yet exist.
- » great storytelling
- » Hand haptics
- » Hand tracking
- » Haptic feedback that is non-invasive and easy to use. Also, tracking systems that are more aware of the environment around the user to help with user obstacle avoidance.
- » Haptic feedback, finger tracking, along with wireless technology as a standard.
- » Hardware
- » hardware
- » Hardware advances were too slow, maybe it is related to the power source issue, battery
- » hardware limit, heavy helmet and high speed PC constrain the application
- » Hardware needs to be smaller/more comfortable and cheaper.
- » Hardware size, power and resolution and scale of display / presentation
- » Having to buy a high end rig to experience high end VR
- » HD 6DOF wireless HMD
- » HD experiences requiring dedicated space and setup time. Inside-out tracking hasn't yet had its day.
- » headgear- needs to be wireless and stand alone
- » Headset. Physical weight and tethered to something.
- » Headsets
- » Headsets and hardware for diverse users.
- » Headsets are too uncomfortable.
- » Health issues mostly for VR experiences, many people especially where I am coming from(Tanzania, Africa) many people are afraid of destroying their eyes.
- » High quality images on AR combined with good tracking
- » High resolution at low cost
- » High-end VR quality with cordless light mobile experience will be the key to this.
- » Higher resolution for VR, more unobtrusive hardware for AR/MR.
- » HMD bulkyness. Wires. High cost.
- » HMD design/weight
- » HMD form factor, till the headsets look and feel like normal eyewear we will not see mass adoption.
- » how not to have to use goggles.
- » How to deliver AR without glasses, headsets, or screen-based devices.
- » How to increase the visual fidelity in an accessible and affordable way.
- » How to make AR/MR more accessible in the outside world...less tied to heavy tech burden, more to offering knowledge filters for understanding the world outside the classroom...
- » How to make them social
- » Huge GPU demands in order to render many pixels at the periphery of vision
- » I believe that the medical and educational area will benefit greatly
- » I don't know
- » I haven't yet seen an AR headset that I believe can deliver on consumer expectations. The rendering capabilities, the development pipeline, and the consumer infrastructure are all still too prototype-y.
- » I think the movement in VR is still a problem. There are good solutions but they still are not the solution for everyone.
- » I'm not sure, but I would like to learn from other developers to hear what their struggles are and report on them.

- » In AR, physical occlusion. The immersion breaks immediately when something that should be occluding the virtual images walks in front of the camera. In VR it's still about display resolution, wires and the price. I'm really looking forward to devices like Oculus Santa Cruz to remove the need for an expensive PC and a wired connection. Display resolution is more likely to be solved by foveated rendering and high density displays, rather than mechanic-optical solutions such as the Varjo.
- » In vr is the space limitation, you should be able to wal or use treadmill accessories
- » In VR the biggest design problem is to deliver without clunky gear. In AR the gear issue is less onerous but for MR the ideal is not yet here - Microsoft with the 'Holographic' approach is getting there but MR here is still a mixed AR/VR approach at this time. The major missing link is the ability to project a virtual reality into the real world with real people all interacting with it and each other (preferably without clunky headgear) but we're not there yet.
- » In VR: movement in the real world In AR: weight and form factor of the device
- » Inside out tracking; high-resolution untethered HMDs with touch controllers for highly interactive experiences.
- » Integration into everyday life. 360 B-Format is back in the upward trending portion of the consumer technology curve.
- » Interaction
- » Interaction with the environment
- » interactive character development
- » Interface - the VR rig is still bulky and requires "suiting up" (even putting on a mask). AR has more accessibility through existing tech (phones)
- » Intrusiveness, lack of best practices to appeal to larger audience (current practices are "mvp" at this point)
- » It is not the technology it is the experiences, game design, product - Creatives need budget, access to affordable HW & SW solutions and creative space
- » It's a matter of cost and content right now. Cost is not low enough and there is no must have content
- » It's still a little clunky
- » Lack of a VR/XR equivalent of Photoshop --or Powerpoint--something for people to be able to get their content into the platform
- » Lack of design for young adults and children with vision impairments
- » lack of massive home compute power, and headsets are still relatively tiny babies compared to what we "should" be expecting in the "not so distant" future.... (so; lack of power)
- » Light and cheap devices.
- » light and comfortable head wear with great field of view and see through
- » lighter and cheaper devices.
- » Lighter, higher functioning HMDS, with the content to back it up, is the biggest hurdle.
- » localisation for world scale ar.
- » locomotion
- » Locomotion
- » long range movement is still an issues in VR. Teleporting is not great.
- » Low latency environment mapping
- » Making a mobile VR headset that has great battery life.
- » Making it user friendly enough so any will will want to use it.
- » many weight cost angle of view sound - headphone mobility things that company like Magic Leap promise which we do not really expect too much from it. --> more work needed for AR
- » map rendering
- » Mass user communication platform without latency
- » Memory/performance issues on mainstream devices.
- » Miniaturization of equipment.
- » Miniaturization, locomotion, tactile feedback.
- » Miniaturize displays w/o losing resolution High precision tracking

- » Mobility
- » Mobility and battery life.
- » Mobility concerns like tethering and fixed base stations.
- » More cameras with orientation
- » More streamlined headset management
- » Motion Sickness
- » Motion sickness
- » motion sickness, visual quality, field of view, latency, hardware constrictions
- » Motion Sickness/Lack of Felt Force.
- » Movement
- » Movement and UI
- » Movement in VR causing motion sickness.
- » Movement, Touch
- » Moving AR beyond using phones/tablets is crucial. Also bringing 6-6 VR systems down in price.
- » MR FOV
- » Multi-user functionality
- » Natural movement around a space and having to put a box on your head
- » nausea and discomfort
- » Nausea. Cumbersome hardware.
- » Nauseating effect.
- » Need to develop a safe location for immersive VR experiences and the cost of the good gear. Cell phones are not a practical long term device for VR and AR.
- » no more button controls
- » not been able to replicate body motion, touch, and smell as an integral part of the experience
- » Not enough audience research on where to find viewers, which platforms are most engaging, what times we should be releasing, biggest audience demographics to engage.
- » not sure
- » Not understanding what makes a unique compelling experience. Cost to achieve compelling content is currently too high for ROI.
- » Omnidirectional motion for VR. Slim design tech for AR.
- » Optics
- » People want to see the augmented item in different angles including from above, below, behind, etc... Many experiences show a forced view of a certain angle. That needs to be improved.
- » performance at a reasonable cost
- » Performance is still a huge challenge and optimization to meet performance targets takes too much of project time
- » performant webvr
- » Persistent large scale, multiplayer experiences
- » Photorealism in AR
- » Player locomotion / movement and the ability to render photo-realistic graphics at 90 FPS.
- » Player movement in VR for games is still a large struggle.
- » Portability + cost for high-quality VR.
- » Practical HMDs for AR.
- » Preventing people from getting sick when using VR, clarity of the visuals, having a VR headset that is light and perhaps doesn't sit against your skin (women wear makeup, that goes onto the headset) - I think these are being worked on but not mainstream yet
- » Price
- » Price for hardware. Hence my answer to go with Oculus Go for the next project. \$199 is still a bit high, but within the sell-able range for the clients to get their hands on VR.
- » Price for users

- » Pricing of hardware.
- » Problems with discoverability = bad Platform UI, which is easy to fix. Sleek XR glasses that seamless do both VR and AR and aren't clunky.
- » Proper immersion though it's possible it is easy to break out from your state of immersion with annoyances such as cables rigs etc
- » Rapid prototyping across platforms/devices with multi-user support
- » readable, high res 3D displays for AR Fast enough frame rates and tracking so people don't get sick
- » Remote-free controllers and interfaces though leap motion seems to be doing a lot of research here
- » Remove Wires
- » removing the need for a HMD display, altogether
- » Resolution and 6dof w inside-out tracking
- » resolution, comfort, foveated (good eye tracking)
- » Resolution, portability, locomotion
- » Resolution. I think that being able to deliver higher resolution experiences without latency or eating tremendous bandwidth is probably the next step to making an universally consumer device or experience.
- » Responsive design. Great UX for AR/VR/MR
- » retinal quality hardware resolution
- » safety of users and effective collaboration between them
- » Seamless experience
- » Semantic understanding of the world
- » Shared Portable experiences
- » Sharing experiences cross-platform. I would add Web XR to the list of choices.
- » Sickness of users
- » Simulator sickness triggers
- » size and freedom of movement
- » size of consumer devices
- » Size, battery/wireless charging, eye-tracking/FOV, foveation, extensible natural interfacing, 3D audio and selling environments that exploit virtual capabilities rather than trying to mimic real world aspects.
- » SLAM
- » slow adoption
- » Smaller form factors, and use cases that consumers understand and comprehend. Many consumers see gaming or film but don't really understand why spatial technologies can be useful.
- » Smooth and sleek user interaction
- » Space is still an ongoing issue. Recent reports from Oculus have deduced that the most popular way to participate in VR is seated. OF COURSE IT IS!!! Most people's PC's reside on a desk in a room, most likely with other furniture in it. Very few people have the space necessary to experience a standing free-roaming VR experience.
- » Space, weight and power for HMDs
- » speed wireless head set connections
- » Standalone headsets that make use of users' hands as controls.
- » Standardized tech that is affordable
- » Still no perfect solution to motion sickness if you move the player the wrong way.
- » Story telling. First person shooter, driving is fine but a DR, maintenance worker, Repairman, the average person needs to be able to use and understand it in real life as well as escape-ism. and that is on us the XR community not just a toy.
- » Tactile feedback in VR
- » The 3D AR apps size is still big , and not every devices can run the apps perfectly and different platforms need different codings.
- » The ability to make a lightweight, portable, and affordable option for headsets, as well as solving motion sickness in some users.

- » The ability to share experiences with a group: Isolation factor of the headset
- » The biggest unsolved technology problem and design problem in AR/VR/MR has been versatility and integration. Moving outside of the range of a gimmick and into the future of storytelling, information engagement, and integrative social dynamics is the most significant movement needed to change the role of AR/VR/MR as a computing platform.
- » The Display Resolution is the biggest hurdle today.
- » The equipment is cumbersome. It needs to be as comfortable as wearing shades.
- » The goggles aren't good enough yet. Too clunky
- » The headset size/field of view/power dilemma - but that will be solved by Moore's Law, so no worries!
- » The Interface between the User and the Technology is still the biggest unsolved problem. Intrusion on the user's space is still unresolved.
- » The physical bulk and user navigation in a 3d environment
- » The power required to run a headset and its graphics, there are phones and cameras that have 2k, 4k, graphics. Design? As large as the headsets are you would expect the lines to be wider with no black spaces
- » The problem is the limitations of the frameworks. Not only ARKit or ARCore are very limited right now, with the primary interest to build features that are cool. Supporting technologies as AI and image processing are much too hard to integrate to develop really interesting and immersive experiences.
- » The size and weight of AR devices
- » The size of AR apps is significantly higher than most other apps.
- » The term 'augmented reality' cannot yet be taken literally.
- » The weight and size of HMD's
- » there is too much marketing, too many marketing firms, too many sheds renting space when basic design issues are being ignored
- » thin displays on fashion eye wear
- » Thinking beyond gaming
- » Throughput. It is an unsolved problem to put enough people through an experience to become profitable at all hours of the day.
- » Too many low-quality devices with limited inputs. As an early adopter of Leap Motion, I'm still not sold on the UI potential of hand tracking. We need haptic feedback.
- » Top with company, create ideas.
- » Transmission of data sets actual business revenue to support
- » Unification of UI patterns
- » unified interaction models
- » Universal platform to create such experiences
- » Universal standards around multiapp
- » untethered and powerful HMD
- » Unthetered hmds
- » Unthetering
- » User interface / user experience
- » User retention, friction getting into and out of VR.
- » UX and how experiences are discovered, accessed and shared
- » varifocal displays & eye tracking
- » vestibular movement
- » visual fidelity of headset displays.
- » Visual fidelity/frame rate in VR. (Poor UX: 'Screen door' effect.) Design issue: across the board (all platforms), trying to surf the web for any length of time yields severe eye strain due to the bright white backgrounds. We don't notice it much on desktop or mobile, but it's severe in an HMD. Needs to be a quick change for 'Dark Mode' all white websites. (Currently exists as Chrome extension for desktop). (In HMD) MR: limited field of view, hands fidelity. Overall and across the board, not enough smart UX being executed by seasoned UX practitioners. Too many 3D artists/producers (who are NOT UXers) are making usability decisions in what is normally the domain of UX pros.

- » VR = motion sickness. That still hasn't been adequately solved. AR = tracking and FOV. Devices like Hololens are too narrowly focused to make their efforts worthwhile for now. Other AR platforms still have sliding floor plane issues that need to be resolved to make their apps feel more grounded.
- » VR hardware is too expensive and prohibits new users.
- » VR headsets are still too heavy to be comfortable for long periods of time.
- » VR headsets are way too clumsy and sick
- » VR in gaming: Locomotion VR in B2B: Resolution in current hardware AR: Occlusion
- » VR is too expensive and the proposals aren't interesting enough for the public.
- » VR locomotion and AR objects interactions have by far created the most hype before the released of consumer headsets, but after ~2 years of consumer devices, it is clear that these problems have significantly hindered the user experience, and been extremely difficult problems for developers to solve.
- » VR sickness
- » VR/MR still utilizes bulky headsets and awkward controllers. Providing tactile feedback without the need for controllers would be a benefit to all three technologies.
- » VR: connection to the rest of the world AR: seamlessness
- » We need to balance the performance/portability ratio. Either we're stuck with low performance/bad tracking very mobile devices or high performance/very good tracking not comfortable devices. We need to get the sweet spot in the middle.
- » We still have to wear something to experience the 'technology'. We stand in one place, or sit and use alternate controls to move in an alternate world. It seems that our design thinking has not changed much from the 3D glasses that has been around for so long, except now it is much more realistic, interactive, and expensive. It will be truly innovative once we are able to remove the glasses/gear/headphones and become immersed in a place that can be explored. We are not designing innovative experiences, rather immersive experiences. We are improving technology that is developing in a cyborg/human hybrid direction; wearing items to live in virtual spaces.
- » Wearable devices are still too heavy.
- » Wearable integration
- » Weight of goggles
- » weight of hardware
- » weight, size, wireless
- » Why do women get sick in VR more than men?
- » wide spread adoption/increased understanding
- » Wider FOV, better occlusion, higher resolution/ contrast of images
- » Widespread adoption of compatible mobile devices
- » Wifi/Data issues.
- » Wired/Cords and resolution for VR
- » Wireless and screen quality

What projects do you think have best used AR/VR/MR in the last year and why?

- » "Boring" projects we haven't heard about, like training drivers for FedEx and UPS, reducing chances of accidents and injury before they even leave the lot for the first time.
- » (VR) Therapy, surgery, film, though curiously NOT gaming; (AR) Navigation. Each serves a sufficient "non-toy" and potentially perceived as essential purpose
- » Education. * Turning 2D cat scans into 3D MRI data.
- » ?
- » a number of enterprise AR programs have been really innovative in terms of potentially transforming the way we work
- » A/R enabled art. It extends the viewability of casual opportunities.
- » All of the Ready At Dawn Echo games have been incredible! The floating mechanics, the graphics, the clever use of the touch controls, all combined making a truly immersive story experience. *Beat Saber* has been an incredible example of an Indie developed VR game rising to the top! I just watched a

Video of Niantic's multi-player "Laser Tag" experience on the phones. Which was very similar to the HaDo tournament experience in Singapore, and that gets me excited about the possibility of more virtual experiences overlaid into our real world.

- » All things medical. Better practice for practitioners, many complicated surgeries to experience and the ability to see what cannot normally be seen.
- » AnimVR - solid 3D animation workflow.
- » anything corporate or business-related
- » Anything that exists for the sole reason of taking the user to another place.
- » Applications for creatives such as animVR, gravity sketch and tilt brush are opening new opportunities to visualize 3d concepts and tell stories.
- » Apps in VR like Google earth because they're very engaging and anyone can pick it up to learn very easily.
- » AR = PokemonGo. Because it was the massive use of this technology in games. At the moment no other AR project has been able to overcome it. VR = *Lone Echo*. For me it is the best use of immersion, presence, and interaction, in the use of VR. MR: I have not had the opportunity to try one of these equipment.
- » AR assisted Manufacturing
- » AR earplugs, everyone needs it and replaces cell phone.
- » AR for gaming and training and VR for behavioral change
- » AR has hit a new plateau with IOS 12, enabling users to measure, integrate AR into everyday apps in ARKit, and enable advanced tracking on the new hardware. The iPhone X and the iPad Pro are foundational to developing the next phase of AR in everyday life.
- » AR/VR/MR don't know what issues are not ,because like same problem, particularly in terms.
- » AR/VR/MR technologies in remote sided environment
- » Architecture. We are building a physical space. Step inside before you dig the first hole. Healthcare. Allow those with physical or mental ailments to augment their reality.
- » Arden's Wake from Penrose
- » Arizona Sunshine
- » Audi VR - sells cars
- » Auto industry,
- » BBC VR World cup football coverage. Wide appeal.
- » Bear 71 shows how VR and add depth to a project. And Beat Saber shows the gaming potential.
- » *Beat Saber*
- » *Beat Saber*
- » *Beat Saber*
- » *Beat Saber* Invisible Hours *Lone Echo*
- » *Beat Saber* - short bursts of action that don't require users to navigate in the environment.
- » *Beat Saber* - simple physical engagement through motion controllers
- » *Beat Saber* and LIV mixed reality streaming. *Beat Saber* got people excited about using VR and LIV made people look cool playing *Beat Saber*.
- » *Beat Saber* because it takes an arcade style experience and lets users easily share a mixed reality view, thus better showing what being in a VR game or experience is like.
- » *Beat Saber* for pure gaming, entertainment for VR. Big Screen VR for potential for social sharing in VR.
- » *Beat Saber* for taking advantage of the inherent physicality of VR
- » *Beat Saber* for VR
- » *Beat Saber* is immersive and is rolling out a level creator. In a design space where most people engage with the games for a bit and then take the headset off, *Beat Saber* has people coming back repeatedly to keep playing.
- » *Beat Saber* simple, fun, good workout
- » *Beat Saber*, hands down. Most rewarding and responsive ui and gameplay experience.
- » *Beat Saber*, it makes use of VR affordances in a fun way

- » *Beat Saber*, Mindshow(biased), Poly, Cat Exploder. Fun, engaging experiences that are great for 2D sharing and focus on tactile creation + interface.
- » *Beat Saber*, Moss, Farpoint, Google Poly.
- » *Beat Saber*, platform seller for VR. A real use case of immersion meets simple gameplay. The plus side of physical activity needs also to be mentioned.
- » *Beat Saber*, Scope AR and there AR workflow.
- » *Beat Saber*, Snapchat,
- » *Beat Saber*, VR Chat, the Wave VR
- » *Beat Saber*. It uses the motion, the full on experience of immersing yourself into a virtual world, and never ending fun.
- » *Beat Saber*. Very fun
- » beatsaber
- » beatsaber and I like Vive Pro SR SDK content
- » Blocks by Google
- » Brass Tactics. Immersion, fun, can play for hundreds of hours. *Lone Echo*. Immersion, new way to tell interactive stories.
- » cant tell you due to NDAs
- » Carne y Arena by genius Alejandro González Iñárritu gives the VR medium tangible and praiseworthy success, and really elevates the XR medium as a potential art form.
- » CARNE y ARENA was pretty awesome and the Void attractions
- » Cheapest vr platforms to develop
- » Coco VR was really well done and fun. Carne Y Arena was a real standout of VEVR (very expensive VR).
- » cocovr
- » Commercial - solve a key business problem.
- » Creatively there's been a lot of progress and visionary projects. I particularly like projects like 'Zikr' that brought transcendental Sufi dancing to VR as it was really using what VR can give in terms of communicating embodied movement. For my interests, I love the work of Aboriginal Territories in Cyberspace <https://www.culturalsurvival.org/publications/cultural-survival-quarterly/aboriginal-territories-cyberspace> It is visionary, political, necessary, enlarges the scope of what technological communication can facilitate and works at healing the horrors of colonisation and repression of other cultures and ways of understanding.
- » Currently, I believe indie arcade titles like *Beat Saber*, Gorn, and Compound have really innovated the VR games space. Another title that I think struck a really good balance with higher end larger games is Skyrim VR allowing the user to pick between multiple options of navigation.
- » Dear Angelica, Blortasia,
- » Echo Arena because the design is great for VR and mapping the avatar body to the player's is brilliant.
- » Eclipse DNE
- » Education - particularly where you can strip back layers (anatomy for example) to explain a difficult concept
- » education and training
- » Education sector
- » Educational apps
- » Elite Dangerous still blows me away. YouTube VR on an airplane. Oculus go's "just put it on" ease of use.
- » Entertainment and big industry players
- » Entertainment projects since content tends to push the technical capabilities, whereas other industries are still using the basic functions (show/display).
- » Epic's Robo Recall is the most polished game experience I've had in VR. Superhot is my favorite example of actually improving gameplay through VR rather than relying primarily on immersion.
- » Experienced based demo
- » Experiences that look and feel incredible like *Beat Saber*.
- » experimental gameplay games

- » Fable's "Wolves in the Walls" for narrative storytelling in VR with an interactive character. Brilliant.
- » Facebook 360
- » facial animation capture on iPhone x was very cool. I saw that today.
- » Fallout VR and Skyrim VR. It shows how you adapt a FP experience to a VR interaction.
- » Fantasyth for VR - Shows how abstraction in VR can be used to shape an experience not possible elsewhere. BeatSaber for VR - Created a fun, immersive game with a small team around the medium's constraints rather than trying to be something it can't be.
- » Farpoint had some great game play.
- » Festival of the Impossible in SF was a good start. There were no outstanding works, but ART is the only way to map real possibilities.
- » Film industry has done outstanding work using VR
- » Fitness using VR. It is useful and does the job as alternative to other fitness programs
- » Free range VR experiences like The Void, also a HoloLens experience I saw that put an upset child in the corner of the room--very effective
- » games
- » games
- » games and marketing apps
- » Games like Saber and experiences like virtual planning/design
- » Games like Virtual Reality are leading the way for more advanced and creative immersive gaming experiences. Films like Miyubi are taking VR film experiences to a new level in terms of budget and scope.
- » Games, Medicine
- » Gaming
- » Gaming
- » Gaming only
- » Gaming VR project.
- » Gear VR apps at least to introduce people to VR
- » Gear VR, it's a stand alone experience
- » Google earth - it's nostalgic to look at places you know
- » Google Earth VR
- » Google Earth VR
- » Google Earth VR is incredible.
- » Google Earth VR, because of its superhuman ability to allow you to travel the entire globe. Oculus Venues, because of the excellent content partnerships and Oculus' ability to get hundreds of users to coalesce in a venue simultaneously.
- » Google Lens, Google Translate
- » Google light fields work is finally delivering a real high fidelity representation of locations
- » Google Realities (best visuals)
- » Health, training, education
- » healthcare
- » HEALTHVoyager
- » House planning apps such as the IKEA one. It solves a real problem (of fitting furniture in your home before buying) and provides huge business opportunities (being able to buy straight online, without having to go to the store to see how the furniture looks)
- » HUD in automotive
- » I can only say what I have experienced. Four items come to mind: VR Beatsaber Beta, AR Star Wars Lightsaber, VR Evasion Beta, VR Skyfront in Beta still
- » I can't tell you due to NDA
- » I couldn't say.
- » I don't know

- » I don't know if it was the past year, but I did like the PBS Civil War short film that was shot and performed in VR. That was a great way to tell that story.
- » I don't know.
- » I don't understand why there is always talk about the one best solution. That is so narrow minded. There are lots of great products available, all in their own respect. What good for is it to just pick one?
- » I have not seen one stand out to me
- » I haven't looked at much AR/MR, but the official Budget Cuts VR game release made me sore from crawling on the ground.
- » I love the notion of Orbusvr taking on an MMO in VR.
- » I quite like anything by Marshmallow Laser Feast...because who doesn't want to see the world through an insects eyes? They are trying to reconnect children and nature using interesting technology hooks.
- » I really enjoyed Beat Sabre. Family members enjoyed Pierhead Arcade.
- » I think anything that is outside of the entertainment industry, as in not making just for games or video, because so many of those use similar techniques as flat screen media or are converting from the same non-VR game, and don't think outside of the box for the potential that VR can be used for. Haven't looked too much into AR projects but I like the subtle ways it is integrated in some apps as opposed to trying to be extra flashy etc.
- » I think *Beat Saber* is one of the best applications for VR. It makes me don't want to leave VR and I started playing it almost every day.
- » I think it's rare for anyone to be doing a great job in this space as it's still so early, including myself. I'm still yet to see any projects which I think are truly great.
- » I think out of everything I have tried, Natural Loco motion has given me the best experience in gaming to date in Skyrim VR
- » I think The Void did a great job using VR tech. Star Wars Secrets of the Empire was a ton of fun. <https://www.thevoid.com/>
- » Ikea place , the most practical one for customer products in the market
- » Ikea's AR Furniture App
- » I'm a big fan of Google translate, I travel a lot and only speak 1 language, so it really helps.
- » Im a shooter fan and shooter game creator, so I am a big Onward and Pavlov fan.
- » In Finland we have a big project for industrial and property service purposes
- » In general games utilized the technology best.
- » industrial and manufacturing
- » Industrial safety and medical applications
- » Industrial safety training. Neuroscience-oriented applications.
- » Intel VR sports olympics
- » inVRsion' ShelfZone it's an enterprise solution for the retail which could change the ecommerce.
- » I've been busy with other projects and am a bit behind the curve, so can't really say what the latest is.
- » Job Simulator, Gary the Gull, *Beat Saber*, Rec Room
- » Just about every story-telling experience has been the best - why? It totally fits the capability of the current market of devices. These experiences are MADE for the devices yet don't push the user too far in the sense that the users lose their immersion RIGHT away.
- » Launch of Oculus Venues, because it's extending the reach and market for the virtual viewing of concerts and experiences.
- » Leap Motion is pushing ahead with some useful explorations - love how that's transpiring.
- » Lightfields VR, Pokémon Go, Ready Player One - they each were compelling and unique in their own way.
- » Living wine labels
- » Location / Direction mapping in AR
- » Location based entertainment.
- » Location-based
- » Location-based immersive experiences.

- » *Lone Echo* - weightless environment created a nice solution for movement.
- » *Lone Echo*. Their hand interaction model rocks.
- » Lots of good ideas but it's just too nascent to say there's a 'best use' of ar/vr so far.
- » Lots of trials last year, but I haven't seen any prevailing success.
- » luxury markets, particularly yacht and real estate sales, because their budgets allow for newest tech to engage UHNW audience
- » Magic Leap one if it does what is promised
- » Manufacturing build
- » Many of the enterprise use cases for AR have been strong. They often fly under the radar because they are so practical, but they offer an exciting glimpse into how the future of the technology could evolve.
- » Masterpiece VR. It is an example of how digital content creation in VR is starting to become, not only a feasible option in an artist toolkit, but also an improved one.
- » medical
- » medical applications
- » Medical has had quite the use for it to get more of a hands on experience.
- » Medical, because it's giving the most credibility to the market
- » medical, educational and games, have so many.
- » merge cube, its accessible and has introduced millions to AR for the first time. snapchat too.
- » Microsoft / PSVR
- » Microsoft HoloLens is the best solution today. However, there are still many unsolved issues.
- » Microsoft hololens, Snapchat AR and VR games(Oculus rift and others)
- » Microsoft Holotour, very good mixture of immersive technologies
- » Military
- » Military Training applications
- » MIT,JPL, have done a great job at this, from mars to the human body in MR/AR
- » More into industrial applications. As big firm still had vision and money to go forward.
- » Moss - brings an intimacy to the presence we haven't seen before. Actually is an interesting glance into what tabletop miniature gaming could be in VR.
- » Moss, it took classic game mechanics and brought it to VR
- » Mostly games, as they use the interactive capabilities fairly well
- » Movie promotions
- » National CineMedia has utilized AR with gaming in a way that has not been done before. Magic Leap has made some strides as well.
- » netflix VR - a family can watch different media while traveling
- » Nintendo Switch because it is wildly accessible
- » None. There is no killer app (yet)
- » Not really in a position to say as I can't talk about projects that are under NDA and I don't know everything that's out there in this exciting ever-expanding world
- » Not sure. From a video/360, Google ATAP projects and Felix & Paul.
- » NY Times VR, Beverage brands have impressive AR labels,
- » Oculus Go brought price down for entry level users
- » Oculus Go social VR rooms - creates a perfect replacement for the casual gaming mindset that drive mobile phones.
- » Oculus Go, has the best mass appeal and is at an attractive price point for entry into VR.
- » Oculus Rift Go, for making the technology more widely available to the general public
- » our :D in the field of architecture (new technology is being developed by our R&D center)
- » Our project, which is solving the sickness problem of user.
- » Ours ;) Especially our "Alien: Descent VR", because there's nothing quite like it in the world... especially in consideration of our implementation of a completely wireless solution, which is considerably more complicated and immersive than competing experiences, like those from The VOID.

- » personal exploration and discovery, best avenues for learning and development
- » Pimax 8K VR headset and Valve Knuckles controllers since they seem to increase immersion.
- » Pink Kong's Aurora animation movie
- » PlayStation VR because it is more commercially viable with very little setup compared to competition.
- » Pokemon go
- » Pokemon Go for becoming the standard example
- » Pokémon Go or Google Translate that writes right across the sign or menu it's translating
- » Pokemon Go, PSVR, Amazon Alexa
- » Pokemon Go, The Void
- » Pokemon Go. Easy to use, doesn't have much data usage in bigger cities and people can play casually anywhere.
- » PokemonGo. It featured well to a board audience what AR means
- » Probably Snapchat lenses, they've become insanely popular
- » professional simulators
- » ptsd treatment
- » Ready Player One. Enough said:)
- » Real estate sales because it shows the future better than any 2D image.
- » Real estate; architecture
- » Rec Room — Great emphasis on social, mini games, and community
- » Roller coasters that provide a more intense ride by giving riders a VR headset and shows rockets flying through space instead of just seeing the local amusement park.
- » Samsung flagship store Seoul
- » Seurat and other 6 dof imaging.
- » Skyrim VR. Intuitive controls, and the older graphics were already optimized for VR.
- » Slappy Fish Vive Pro demo content showing occlusion of the 3d content behind objects and interacting with hands, not controllers, and using the 3d captured scene that the person is actually in.
- » social vr
- » Software and hardware dev, we need to get smakker and faster.
- » Space Pirate Trainer
- » Special Education needs
- » Sports broadcasting - great way to enhance an existing experience rather than try to create a new, unproven one
- » still haven't seen it yet, still a bunch of great things released but nothing where I haven't seen before or have built myself.
- » still Pokemon Go. Hoping for better soon
- » still waiting
- » Story telling. Empathetic viewership.
- » StoryUP's Healium. Powered by brain-computer interface that allows the user to see their neurological reflection and USE THEIR BRAIN to control the AR and VR assets. Frontiers in Psychology just published study on its ability to reduce anxiety in as little as 4 minutes.
- » StreetView
- » STRIVR, look at their client list
- » Superhot
- » Superhot, *Beat Saber*, rick and morty. Bc they're good games.
- » Superhot, Minecraft, Haptics..... (mentions something about peeking at the plugins and script that would enable the addition of a Emotiv EPOC+ EEG into Unity (etc?) {also mentions finding the code to get some raw output from the thing..... the future looks bright)
- » Terminal 3, Dinner Party, and Manifest 99. These experiences allow you to be in someone else's shoes, which creates a deeper understanding and empathy.
- » The best ones are those that don't need super-crisp imagery linked to the view. Reminders, communication apps, etc. are all good. We'll see usable navigation apps for pedestrians within one or two years.

- » The expanding market for VR games and the hundreds of new VR games being tested and put into the market
- » The HTC Vive Pro's wider screen and higher PPI offer a much more immersive experience for the user.
- » The Isle of Dogs promo from Felix & Paul was a great use of 360 video / Live action VR. Shameless plug for Speak of the Devil VR from Light Sail VR as well.
- » The new leap motion AR glasses, cheap and super useful.
- » The Void experience with Star Wars Rebels
- » The Void makes use of the environment and leverages the plasticity of perception to change reality.
- » The Void pushes the boundaries of location-based experiences well. Current AR still feels very tech-demo/nascent.
- » The Void Star Wars experience.
- » The Void, not only do they use the headset but they recreated a story around a custom version of a portable D-Box chair. (not literally the chair)
- » There are a few awesome applications, my favorite is Nature Trek
- » TheWaveVR. Creating a social, music-driven ecosystem that provides users with the ability to party in never-before-seen ways. Allowing users to do things they normally would not be able to do in the real world.
- » To be quite honest, I'm not sure.
- » Too many to narrow down, but dedicated VR Films are starting to truly explore and push boundaries of the medium
- » traffic systems
- » Training
- » Training and Education has seen a surge in the last year. We also see Enterprise level Visualization and Data with AI Assistance being the best use case in the last year. Again, AR/VR/MR is just an interface to the "immersive" content... Interface is nothing unless you have a real solution the technology solves... otherwise it is just a "novel" technology.
- » Training and education: real-like simulation without real danger is only possible in VR
- » Training. Retention rates of 80% against 20% for traditional methodology provides quantifiable ROI.
- » Training projects with VR, industrial projects with AR
- » Travel?? E-Learning.
- » Trying products on before you buy.
- » Using VR for sick children who can't leave hospitals.
- » Virtual and remote assistance
- » Virtual Rickality / Job simulator / etc. Stylized games made as standalone experiences within a budget. As opposed to free to play (too small a market), mmo (too small a market) or AAA photoreal games that require \$3000 of equipment (too expensive).
- » VR *Beat Saber* — I believe that deep down we've all wanted to be rhythmic Jedi's and slice objects like a boss. Rec Room — Consistent and frequent user-focused improvements. Strong community of repeat visitors. RR creators engage with users both inside and outside of the headset which is one of the many things that keeps me coming back. Oculus' platform design Oculus Go industrial design AR I'm extremely biased in this area, but I love the stuff Google's been working on. :)
- » VR - *Beat Saber*, Budget Cuts come to mind for solid entertainment experiences
- » VR - Go Project Films "Sanctuaries Of Silence" - simple and effective, despite the use of binaural stereo instead of ambisonics. AR/MR - AfterNow's work (e.g. the MR Easter Egg Hunt)
- » VR = The Void and other experiences that marry VR with real-world movement. I also think Quill on the Rift for design and art is pure magic. AR = I haven't seen any AR apps yet that really capture the magic or potential of the platform. Still looking for it.
- » VR Chat
- » VR Chat
- » VR for nurse education
- » VR game Superhot
- » VR: Lightfields by Google AR: iPhone X with its cameras designed for AR

- » VR-> love the *Beat Saber* game AR->
- » VR-Run (platformer game on a ergometer Birdy
- » VRTK enables so many people to build for VR and help evolve the market by rapidly proving what works and what doesn't work.
- » Where Thoughts Go on VR due to peaceful, reflective, non-gaming community engagement.
- » Woorld was an amazing sandbox concept that showed what mobile AR could do. For VR, Virtual Virtual Reality and Shooty Fruity were both great fun.

What are you most excited about in the space over the next 12 months?

- » Bio Games - Digitalization
- » There are many things I am looking forward to but mostly just games
- » if there is funding, funding, funding...
- » 6DOF All-in-one VR e.g. Santa Cruz
- » 6DOF mobile VR
- » 6DOF Standalone + Controller
- » A global AR/VR/MR platform/infrastructure that allows R&D across sectors, with enhanced privacy in terms of security yet adequate transparency for experience.
- » A simple wearable.
- » Ability to collaborate and communicate in VR; higher resolution HMDs & 360 content.
- » adoption by more folks
- » Advancement in technology
- » Advancements in hardware which is what is driving the software. Advancements in explorations of spatial interaction design, incorporation of companion technologies (AI, voice, eye-tracking, blockchain...).
- » Advances in inside-out tracking
- » All in one HMDs
- » Announcement of High quality, cheap, cordless standalone VR headsets
- » Any opportunity to explore new hardware and develop AR/VR/MR apps. Also when is Magic Leap supposed to release their product?
- » Apple glasses
- » Apple joining the AR race
- » Apple's iOS ARKit is going to expand usage by consumers and help drive adoption of VR over time.
- » AR
- » ar enterprise applications
- » AR glasses that work, both functionally and physically
- » AR hardware development
- » AR Headsets starting to ship to retail customers
- » AR is the ultimate location-bases delivery platform. So many things that we can do IF we had lightweight glasses (no worse that conventional eyewear) with hi-res tracking.
- » AR which is not the Holo Lens... Looking to North Star and all the other solutions coming. Integrations of AR, haptic suits and rich multi person VR experiences.
- » AR-> I would love a life changing app using AR. Something we would introduce in our everyday life as they were the smartphones. VR->market penetration. 1 home->1vr headset ratio. :)
- » ARCore and ARKit technologies evolving (the occlusion problem should be quite solvable), and hopefully merging so that it's easy to build an app that runs on both, and still utilizes the technical capabilities to the fullest.
- » ARKit 2 and Magic Leap
- » As the hardware gets smaller, the experiences will be more pervasive as a seamless part of our day to day life
- » Beat Sabre on PSVR.

- » Better hardware coming out.
- » Better hardware. First versions of truly consumer oriented AR.
- » Better HMDs
- » Better tools for AR and VR creation
- » Bigger room scale tracking.
- » Black hole concept, relativity theory
- » blurring the lines between reality more
- » Breakthroughs in Public Art / AR
- » Broader adoption of AR/VR due to increased solutions in the AR space
- » Cheap light weight glasses.
- » Cheaper and standalone headsets
- » Cheaper hardware, bigger players in the space, more market penetration in Enterprise and Medical leading to more awareness. I have always believed that VR was going to be big, but the path to success for VR is getting brighter and clearer. I also look forward to major enhancements in the 360 video space and the rise of photogrammetry to create depth in a real world image.
- » Cheaper headsets.
- » Connected headsets like the Go, the API's are there it just needs to be built in to the development cycle better. Unity is doing a great job pushing that and its only going to get better. However, being able to "just connect" to a conversation in VR over WiFi is where I want it to go. Bring me the Oasis.
- » Consumers adopting the Oculus Go and getting into VR.
- » Continued development of hardware, including Magic Leap One and more developments from Oculus (i.e. Santa Cruz).
- » Cost reductions which may lead to more consumer vitality for content.
- » Creating new art and music
- » Curious to see what Magic Leap have been creating...
- » DeepMotion technology enabling interactive full body avatar in XR.
- » Develop highly immersive applications for low cost consumer level hardware
- » Developing something of my own. Gaming and mapping.
- » development of adaption of standalone vr headsets in mass market.
- » Digital transformation in businesses.
- » Don't know enough of what's next
- » Dropping cost, quality AR HMDs. More UX/content innovation.
- » Edge compute providing JIT services for immersive XR experiences.
- » education
- » Education and vocational training
- » Education.
- » Enhancements in hardware and new input devices such as gloves
- » enterprise HMD's
- » entertainment
- » Even though the Magic Leap's latest showings haven't been great, its success could be a game changer.
- » Ever-present AR without the need to use some sort of viewer or lens
- » Everything.
- » Everything. Too hard to pick one.
- » Evolution of hardware to allow for better experiences and ultimately larger user base.
- » expanded and different usage of Ar/Vr
- » FDA approval in healthcare and disrupting big pharma
- » Finally seeing some hardware revisions which should bring fresh and old blood back to the market.
- » Foveated Rendering; new GPUs from Nvidia
- » Further advancements in technology allowing for better use of VR like high resolution panels, eye tracking, standalone hardware.

- » games
- » Gaming
- » General hardware upgrades and physical shrinkage
- » General progress in the space.
- » Glasses that consumers will adopt
- » Grip controllers
- » growth - both in the tech and financial support
- » Hand-tracking technologies allowing more comfortable, natural interactions in VR. AR game mechanics that specifically leverage unpredictable real-world input for deep gameplay experiences rather than novelty.
- » haptics gloves and Mixed Vr and Ar content
- » hardware constant development
- » high resolution
- » Higher resolution at cheaper cost.
- » Higher resolution displays for better immersion
- » Historical recreations / tours of ancient ruins.
- » HoloLens 2 and my own AR HMD
- » HoloLens 2 coming?
- » HoloLens v 2
- » How the technology is applied to sales/marketing for commercials and branding.
- » Htc vive pro. I want one badly
- » Hyperdeck
- » I am very excited about integration of the hardware Interface into more scalable Enterprise Services and AI Assisted pipelines for User Experiences.
- » I can't tell you due to NDA but it's in AR
- » I don't understand space if it means outer space or just areas to which AR can be applied. If it means areas, then I guess, aircraft maintenance and training area.
- » I think I'm most excited to see how the tech shrinks and whether or not we can finally get a wireless option that has the battery life and resolution to capture consumers' attention.
- » I think it's going to take a couple years for the hardware to be cheap enough, portable enough, and powerful enough to warrant mass adoption. Until then, I continue to be excited about the UX/UI possibilities of tracked controllers.
- » I think that best thing that happened is, that the mobile devices got so strong that they can handle big and complex 3D scenes. Hope the energy capacity of the batteries improves soon so this capability can be used broadly.
- » I think the new wave of standalone VR headsets with better displays, design and content will generate more hardware sales in the next year, which hopefully will bring the industry out of a holding position.
- » I very much want to see more innovation in AR, including practical tools for the home and even things like online vendors potentially utilizing it commonly.
- » Idk yet
- » I'm excited about virtual worlds
- » I'm excited to see more on the Santa Cruz prototype and see how that helps the market grow.
- » I'm excited to see the continued growth of audio in the AR/VR/MR space.
- » I'm excited to see the training and education possibilities.
- » I'm looking forward to the next generation of VR devices, especially from HTC/Valve with the Vive Knuckles being a really promising piece of hardware that will allow developers more fine tuned user input to work with.
- » Immersive training in VR
- » Improved form factors, cloud enablements
- » improvement of VR sickness
- » Improvements to wireless, experience-enhancing input/control and feedback, and more creative, medium-specific experience development

- » In a weird way, I find the lack of external hype to be therapeutic because the VR/AR/MR enthusiasts have remained in the industry to create great content and continue to push the boundaries for development and design in this field. So I'm really excited to see what new techniques or technologies creators come up with!
- » Increase in user base allowing for more funding, testing, and refinement
- » Increased FOV, higher performance
- » Increases in FOV Power of CPU and HMD's and better penetration into the industrial markets
- » industrial uses for AR
- » Integrated wearables, probably next 18 months though.
- » Interactive experiences
- » it's a secret :)
- » keyboard and mouse support
- » Knuckles controllers, more physical injects tracked in VR. QoL improvements like ergonomics and weight
- » Landing more scenarios on the Enterprise space
- » Large scale virtual reality environments
- » Launch of our Plattform Superplay, combining be and fitness, enabling e fitness
- » LBE will explode and there's a lot of innovation in that space
- » LBVR, Kids & Corporate education, medical and hospitality, retail and sports.
- » Leap motion's low cost AR headset, otherwise it will be an uneventful year.
- » Learning more about the field and starting to make money with them.
- » Let me tell you what I'm most concerned about: Privacy issues and ethics in the VR space. As long as there is an ad-driven business model, there will be incentive to create detailed user profiles. What Facebook et al. do now is bad enough and well documented, but when you add the ability to track and retain data about eye movement and other biometrics, you are entering very, very dangerous territory. That data, especially in AR environments, is too intimate for anyone but the owner of those eyes and that body to have access to. It is the closest thing to reading one's mind short of actually doing so. Computational inference can already reveal things about us to strangers that we haven't disclosed-- information that can be used harmlessly to get us to click on ads, or with sinister intentions to disrupt democracy, goad extremism and exacerbate social tensions. These are already problems that are blowing up and tech has not shown much ability to solve. Add the biometrics from AR/VR use to ever more sophisticated neural network processing and you have a potent tool in the hands of people who cannot even handle the comparatively benign thing they've already created. This cannot ever be considered acceptable. Ethics at the intersection of AI and VR/AR/MR needs to be the horse before the cart at every step. We've already seen what happens when ethics is an afterthought in the development and deployment of new technologies. VR/AR/MR needs to recognize it's potential impacts and lead the way, not wait for a catastrophe to realize there is a problem.
- » Life Sciences, Travel and Learning/Training are industries to watch out
- » lightweight standalone systems
- » Liv offering better mixed reality options and more hardware in both the VR and AR sector hopefully at lower price points for adoption.
- » localized spaces, multiplayer ar, rgb / slam 3d mapping, ml/ai applications in cv
- » Location-based immersive experiences.
- » Looking forward to see MagicLead product
- » Looking forward to seeing Magic Leap capture attention of more mainstream audiences
- » lots of different types of content to be released
- » Lots of high-polish games coming out for VR!
- » Lots of new users and Wireless High end PC VR
- » Low priced hardware
- » Magic Leap
- » Magic Leap content

- » Magic Leap is real progress, single RGB camera computer vision is progressing rapidly, Hololens 2 will be quite something, Niantic's Harry Potter title, 'AR cloud' tech from YouAR and 6D, Leap Motion are really coming of age
- » Magic Leap One
- » Magic Leap One
- » Magic Leap One launching
- » Magic Leap one.
- » Magic leap should be interesting. Either it validates the hype or sets AR back years.
- » Magic Leap, ARkit, Wireless Vive Pro.
- » Magic Leap, as a dedicated platform for integrating mixed reality and the physical environment, is uniquely suited as a framework for combining VR, AR and advanced approaches to MR to enable a new platform in computing to emerge.
- » Magic Leap.
- » Magicleap
- » Mass adoption so that this technology used for healthcare can get into the hands of those who need it most
- » massively multi-user AR
- » Maybe some new buzzwords?
- » Mental Health
- » Microsoft Hololens
- » Mixed reality
- » mobile AR
- » Mobile VR
- » Mobile. Mobile. Mobile.
- » More accessible hardware
- » More AR platforms
- » More compatible devices in the hands of consumers.
- » more connection between distant people in various places without language complexity
- » More geospecific experiences
- » More large publishers and developers exploring the space.
- » More lightweight VR devices will be released for more senses in addition to visual or audio.
- » more multiplayer vr experiences like VOID and Alien
- » More positional tracking
- » More Standalone Headsets.
- » More support on console game systems.
- » More training use cases with AR and XR
- » more user adoption
- » More VR titles that will only improve the experience as developers get better at leveraging the technology.
- » More, better products being produced now that more experience has been acquired in the production of these games.
- » Moving the hardware forward
- » MR/AR we have the opportunity to start a whole new revolution from computers to smartphones. IF we can tell a compelling story and not just as a toy
- » My company's product
- » My game "In League" haha. Another MP tactical shooter but I have really just put everything into the game that hasn't really been done yet with a lot of realistic physics interactions like weapon>environment over the network, and total freedom of movement with climbing and run in place IRL to sprint in game.
- » My new speciality is high end volumetric/holographic capture, so I am really geeking out on this process of getting real life objects and humans into the digital world.
- » My own stealth projects
- » New AI developments

- » New and interesting examples with eye ware
- » New devices
- » New hardware and software...and I don't even know what they will be given the creative ramp up we are in...I just know they are coming and could feed a paradigm shift in education...
- » New hardware, more peripherals, and increased adoption.
- » New hardware/software technologies to enable innovation in the space
- » New headsets
- » new HW
- » New product launches from Oculus and Magic Leap
- » New projects
- » New software updates bringing new features to make development in VR/AR more friendly and easier
- » new solutions or benefits developed from user insights gained from VR research implementation
- » No project I've heard of is really getting me excited yet.
- » none
- » None of this time, companies, manufacturers and consumers.
- » Not excited because not making money to stay on the industry.
- » not much, we're a couple iterations away from successful consumer products
- » Nothing, really.
- » Nothing. It's dying in front of your eyes. I'd like to believe that Magic Leap has something special and revolutionary that would see me walking around my home, full of AR characters and props but I ain't holding my breath
- » Oculus Go and how this can be used in schools
- » Oculus Go as a decent but affordable product
- » Oculus Santa Cruz
- » Oculus Santa Cruz becoming an affordable all in one games VR product - at a console price point.
- » our own designs are exciting.
- » Our project
- » Overall AR development
- » PC-less VR headsets and wireless functionality for tethered headsets.
- » Possibilities in 360 B-Format music.
- » possibilities in education.
- » price drops and monstrously powerful hardware
- » Pricing of hardware decreasing.
- » Producing our hybrid 6DOF, 360 video and MR art installation.
- » Proliferation of multi-user apps in mobile devices
- » real estate, commercial and residential
- » Reduction in costs, accessibility
- » reduction in size of hardware
- » Refinement of AR hardware and availability of more AR applications.
- » Release of Magic Leap One
- » release of my own project
- » Releasing my own content!
- » Research and Magic Leap announcements
- » Rest of the industry finally figuring it out that Enterprise is the play
- » Return to actual reality
- » rubber hitting the road with some AR devices
- » Sadly not much :/
- » Santa Cruz
- » See what magic leap does
- » Seeing if anyone comes up with really good content

- » Seeing more lower end devices coming out to help people who normally couldn't afford a VR-Ready PC system AND a brand new VR set.
- » Seeing the market size actually catch up to the investment the industry is seeing.
- » Seeing the next generation of VR headsets, and hopefully seeing an increase in hardware owners.
- » Seeing what content comes out. The Go and Solo are great, now need the content.
- » Self contained VR units. peripheral free hand tracking.
- » Showing new product lines to willing buyers
- » Slow but definitely coming market growth
- » SNS space
- » social education
- » social impact VR
- » Software is getting better and more immersive as tools improve.
- » Some advances, but not actually significant one
- » Sporting events in AR.
- » Stand alone 6DOF HMDs
- » Standalone 6dof headsets
- » Standalone 6dof headsets
- » Standalone devices becoming more and more prevalent in the market. This price point will help the industry reach a new wave of people.
- » Standalone mobile headsets with full positional tracking for head and hands. Location based VR. VR Arcades.
- » standalone VR
- » Standalone VR
- » Standalone VR headset adoption (hopefully access to 6DOF), and the release of the Magic Leap One.
- » Standalone VR headsets with 6DOF. This will change everything.
- » Standalones reach.
- » Standardization of formats / improvements in overall quality
- » StarVR
- » StreetView and Maps/Lens API
- » Stress level zero's FPS mechanics.
- » Taking people out of harms way while helping them solve their problems or work more efficiently.
- » Taking what I have learned in the past two years developing VR/AR and applying it to new projects / ideas.
- » Tech catching up to Hype
- » Telemedicine - New funding from Congress may bolster real deployments
- » The adoption by the furniture industry.
- » The availability of all in one units
- » the battle between AR Kit and AR Core, along with the development of tether-less VR Headsets.
- » The cohesiveness of ARCore and ARKit under the ARFoundation that Unity has constructed. Simplifying the persistent data that people leave in the world in AR. Essentially making AR replace the Hololens' ability to save data in a room you were previously in and able to load it back. Multiplayer experiences. Ease of navigation using tokens/icons and even maybe an arrow that augments in the world to lead you while you walk or drive. Mapping perfectly to the road or sidewalk. So much potential with AR!
- » the development in hardware and on software the advance in markerless tracking or also object tracking
- » The explosion of location-based experiences and the penetration into business training.
- » The explosion that will come within the next 6-18 months as applications that augment peoples real lives come online from the simplest to the most complex ways. That will be complemented by the technology advances that will make delivery easier, ubiquitous, entertaining and really useful!
- » The games have been amazing and I am looking forward to experiencing more. Very impressed with the projects I have been shown.
- » The growth of social VR.

- » the increase in computing speeds to facilitate even better graphic content.
- » The launch of Oculus Santa Cruz and FDA approving headsets like Looxid Labs and VR health apps for therapeutic use.
- » The new HTC VIVE controllers, along with 8K display tech.
- » The next gen Oculus and HTC Vive hardware with better resolution
- » The next steps in ARCore and ARKit.
- » The possibilities for immersive entertainment; specifically location-based entertainment... because that's the sector I'm most focused upon, naturally.
- » The release of a lower cost hololens and the leap magic AR goggles
- » The upcoming innovations with regards to the convergence of VR & AR, also known as MR.
- » the user growth
- » To see how close we are to getting a MMO that incorporates our current surroundings, that we can interact with.... *cough*ready player one*cough* I know not within a year but you never know
- » Training
- » Universal AR applications
- » untethered HMD
- » upgraded hud
- » User growth
- » User's starting to deploy
- » using the technology to break through the clutter
- » Virtual YouTuber
- » Vive Pro and seeing what people come up with for the stereo vision portion of it. People have already done some things for Hololens that are applicable, but having the use of a full computer makes so much more possible, potentially visually interesting, and interactive in more useful ways.
- » VR and MR equipment that do not require cables.
- » Want to see more more multiplayer spaces where you can interact and launch apps with your friends.
- » Way findings for patients in indoor navigation
- » we are developing k-12 curricula based on AVR technology
- » WebAR
- » WebXR and it's growth in development and usage. I'm also excited about all the latest face tracking and mocap tech making their way to the market.
- » Wireless VR. New apps from Apple once iOS 12 and ARKit 2.0 ship. Virtual fitting rooms.