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2022 Tony Stark's Buyer's Guide: Best XR Gear, Tools, and Compatible Software

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Learning Objectives

- Learn about technological advancements and the need to create immersive experiences to enhance projects with a competitive edge.
- Explore simple options—from free VR apps and entry-level headsets to expensive options to suit budget and design requirements.
- Have a quick overview of compatible Autodesk software and VR/AR industry workflows ensuring optimum VR/AR experiences.
- Be the next Tony Stark: Develop your own unique XR buyer’s guide, and make informed decisions when implementing custom VR/AR workflows.

Description

Want to be the next Tony Stark? Then this session is for you!
Come explore this extended reality (XR) buyer's guide with a quick overview of virtual reality and augmented reality (VR/AR) industry workflows, ensuring optimum immersive as well as augmented experiences. As the VR/AR industry advances toward innovative solutions with tethered and untethered VR gear and a wide array of tools, apps, and software, consumers and end users need to make informed decisions about buying and using the right gear, apps, or software for their custom design needs.

This class will offer a deep dive into the best VR gear (headsets-wired and wireless, cybershoes, haptic gloves, and so on). We'll also discuss top-notch VR/AR tools and, most importantly, discover compatibility with our Autodesk software. If you're looking for information on the best combinations of all of the VR essentials to suit your budget, then this session is your one-stop shop-with recommendations, bonus reviews, and pros and cons serving as an expert buyer's guide.

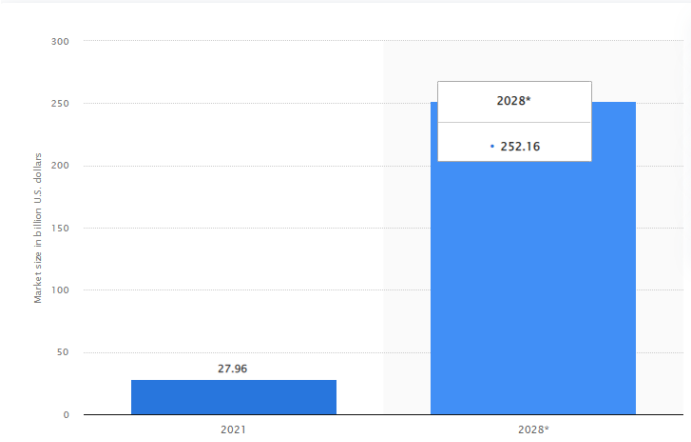
Speakers

Viveka Devadas is a Technical Specialist for AEC/VR products at Autodesk who helps customers adopt advanced visualizations and Extended Reality (VR/AR/MR) solutions. She is a trusted advisor for enterprise priority customers and also networks with students, architects, designers, the global Autodesk product team, and the Revit community worldwide. With a background in Construction Management, her journey into the AEC industry as a Project Architect has been rewarding. Inevitably, it was a process of discovering her passions in advanced interactive visualizations - especially the XR industry, and she continues to explore design challenges that constantly evolve how we connect with people, data and experiences!

Shaik Sadiq is a Technical account specialist for Media and Entertainmnet products. He joined Autodesk about almost 6 years and have been working with Gaming and VFX industry teams.
In my previous life he has had the privilege of being a part of VFX projects like “Life of Pi”, “Doctor Strange”, “The Passengers” and few others as well. Located in Toronto, Canada he likes skiing.

The Global AR/VR/MR Market which was valued at **USD 27.96 Billion dollars in 2021**, is now expected to reach a value of USD **252.16 Billion dollars by 2028**

There’s never been a more exciting time to dive into extended reality that is constantly advancing, but today, it’s easy to feel overwhelmed by the constant iterations of high-end gear, numerous apps, and all the various possibilities. There is a necessity to craft your own XR technology toolbox then we have some exciting ideas for you that you can adapt to meet your changing needs.



Source: Statisca

We need to understand why we need XR experiences, and what are the technological advancements, in different industries diving into creative possibilities. Then we need to take closer look at the compatible software apps leading into the XR exploration to look at some of the latest XR gear, gadgets and a few amazing unique XR accessories for crafting a custom tool box with a buyer’s guide with budget friendly setups that work with specific design requirements.

Contents

What are today's common Design Challenges?

In recent years, there has been a wave of initiatives and advocacy that draw attention to XR Today there a lot of scope for innovation in XR, but as with every advancement in technology there are numerous challenges.Time Consuming Processes multiple platform switches, communication issues, long wait times and difficulty resulting in frustration leading to unexpected delays.In media and entertainment industry, a professional spends a lot of time on researching the technology they want to use even before starting to design for XR. Megaprojects are significantly more complicated than an average construction project just due to their sheer size. Larger projects are prone to more risk, regulation and, unfortunately, mistakes.

Extended reality Technology this plays a key role in resolving these challenges in most industries.

Today's projects require broader teams and seamless collaboration in less time and that's exactly Why we need XR experiences. XR stands for "extended reality," an umbrella term that covers Virtual Reality, Augmented Reality, and Mixed reality. XR technology encourages multi-user collaboration. All XR tech makes use of the human-to-PC screen interface and modifies it, immersing you in the virtual environment (known as virtual reality), or augmenting the user's surroundings (Augmented Reality), or both of those combined known as Mixed Reality. Mutli-user collaboration sounds like fun team work which is a huge time saver for our ecosystem.XR technology offers delightful user experiences and It enhances everyday life, it also blurs the line between reality & virtual world. Research studies show experiences make us happier than physical objects and overall makes the digital encounter much more delightful. Most importantly, these two factors drive a successful product adoption

Technological Advancements in industries

Architecture, Engineering, Construction (AEC)

The advent of Technological advancements in XR means industries can expand their resources beyond a set radius and there are certain flavor of combinations and resources that are known to

work well together. With Extended Reality, Architects and designers are creating novel ways of working.Today we can conduct initial design reviews, collaborate virtually both internally and externally with clients and most importantly make design decisions. There are a number of targeted use-cases in order for XR both immersive and interactive to become a daily tool or become part of our lifestyle. In AEC, XR is used in Historic restoration, used with Construction robots in sites and for the gamification of built environments. Training scenarios are created that help operators prepare before they go onsite for maintenance and operations.The AEC industry in partnership with the XR technologies will help develop cutting-edge solutions and seek a competitive advantage in the global market.

Healthcare

400 healthcare patents filed in the metaverse as people look to the virtual reality platform to drastically improve the healthcare industry. Virtual reality is also being used in medical training and it is already being put into practice. Johns Hopkins surgeons use augmented reality headsets to perform surgeries and medical schools are also using virtual devices to teach students.

XR can help patients with anxiety and phobias. For example, to alleviate the discomfort of getting an MRI scan, researchers developed a virtual reality system of a MRI (magnetic resonance imaging) space with sounds and movements incorporated to immerse the patient for a pleasant experience.Home health is gaining momentum with healthcare monitoring devices that use sensors and cameras to track the health of patients periodically.

Infrastructure

Using drones to inspect infrastructure projects is a complete gamechanger. The technology improves safety, faster and easier inspections, more detailed data collection, and reduced costs.Drones and XR technology are highly efficient as they can easily identify bridge corrosion, fractures, and more. Evaluation and visual inspection will become more reliable and accurate which will be helpful for our engineers.

Automotive

VR enables car manufacturers to test their cars under any weather conditions and in any location. Official car dealers have a few available car models in their showroom. VR eliminates the need for renting larger areas and placing many cars in dealerships. Virtual showrooms can be easily and quickly be implemented regardless of the size of a building a dealer rents. With a VR Head Mounted Display, customers can individually configure their car and see every detail in a virtual environment, selecting from various equipment options. This positively influences customer shopping decisions since they can try out what they’re going to buy.

Media and Entertainment

The media and entertainment industry has experimented with XR technology in a very creative way. Filmmaking techniques called virtual production, existed for years, but the innovation is that in movies like *The Mandalorian*’s alien planets and stars were actually viewable by the actors on the day and, most important, it moved with the camera. The Mandalorian crew using Epic's Unreal engine and 20-foot-tall and 75-foot-long set of LED screens. This technology immerses

both the production crew and the cast inside of changing CGI environments. The Mandalorian didn't shoot in front of green screens or on location in Tunisia; instead, its actors performed on a giant LED stage in Los Angeles where the background appeared exactly as it would for audiences as well. Virtual production allows crews to shoot anywhere at any time in one location, and helps the actors immerse themselves in those worlds more effectively.

Compatible software

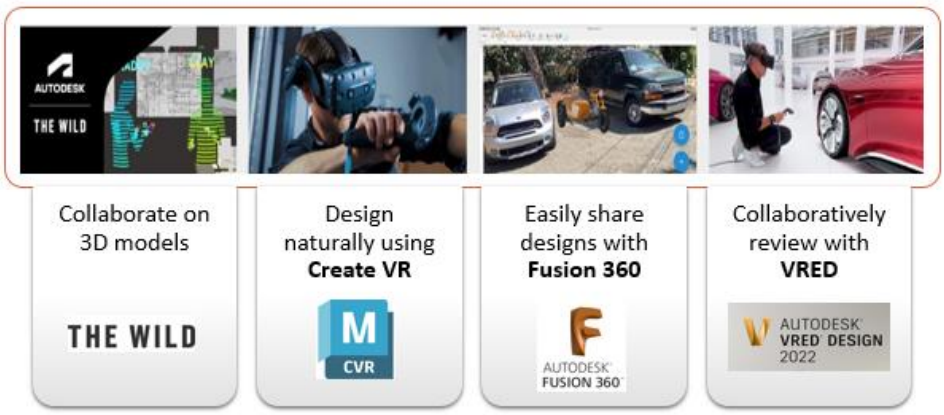
Industry collections

Our Autodesk industry collections offer an integrated set of tools to help you create more imaginatively,solve complex problems and make better design decisions. Each collection includes the essential products for your industry at one great price.

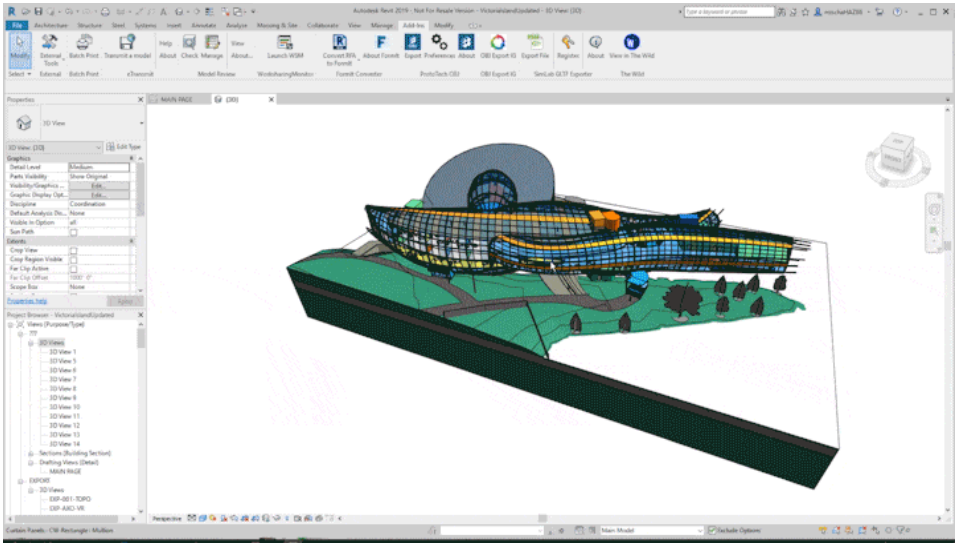
We have our 3 collections: AEC, PDM, M&E.

XR at Autodesk

XR will fuel the industry convergence at Autodesk. At Autodesk we want to create opportunities to help users make smarter decisions by providing compatible applications that interact with complex data So now, Let's look at our XR solutions that span over multiple industries We have core teams representing many different functions who are working on continual enhancements to our products.



1. **The Wild** enables real-time immersive collaborative design reviews using 3D models especially for Architecture, engineering and construction teams.
    - Wild is an immersive collaboration platform for building teams of upto 8 people to present, collaborate, and review projects together from anywhere for better alignment and smarter decisions. The best way to get your work from Revit into The Wild is via our Revit Add-In.
    - It creates a space in The Wild from any 3D View in Revit. You just need to download the Wild add-in. When bringing your work from Revit into The Wild via Revit Add-In, it's a good idea to keep your models lightweight. This will help The Wild run smoothly and content to stream quickly for all participants.
    - Some tips to get the most out of your Revit content is to use section boxes and setting visibility to make you export relevant content. Once you've got a nice 3D View set up, you're ready to get it into The Wild!



2. A designer can create fluid 3D sketches in **Create VR** for most 3D Applications. Create VR is a plugin for Autodesk Maya. Which artists can use to create environments or creatures in Maya's Virtual view.
3. Users can easily share designs with **Fusion 360** - Fusion 360's AR transports designs to real environments for further analysis.
4. Automotive design team use **VRED** to review and explore immersive and collaborative design features.XR will fuel the industry convergence at Autodesk.
5. With **Twinmotion**, Revit users can easily bring their designs to life and create high-quality visualizations in a fast, interactive design process. Everything from stills and animations to immersive VR is possible. Autodesk is partnering with Epic Games and taking other steps to prepare its design software for the metaverse.

Source: Epic games

6. Artists tend to Make assets in **3D applications like Maya/3ds Max** and texture them using photoshop or substance painter. They also animate the assets in these applications as well.Once the assets are completed they can be exported into Run time engines like Unreal or Unity where they are set up with lights and effects. After this the scenes can be exported out to platforms like windows, Android or IOS.

Platforms and applications

There is a rising demand from customers as technology constantly evolves. At Autodesk, we are continuously adapting products to meet changing customer needs our Diverse technologies will needs to work together– driving the need for interoperability standards. We strive to use our partner network to stay at the forefront of innovation and technologies

- **Unity** enables architecture, manufacturing, entertainment, and more to bring Autodesk data into immersive real-time 3D environments (AR/VR).
- **Epic Games' Unreal** extends your investment in Autodesk solutions to create rich, immersive experiences. (Twinmotion)
- **NVIDIA CloudXR** increases efficiency for designers, engineers, and artists by extending Autodesk data with streaming XR experiences.
- We have ARKit apps for ios devices and Google arvr for mobile devices and there is also Metaverse which has become hugely popular
- **Arkio** is a collaborative design tool for VR, desktops, tablets, and phones that provides bidirectional workflows to Revit and BIM 360.
- **Resolve** is a collaborative VR software that is used in construction operations and maintenance. (Forge)

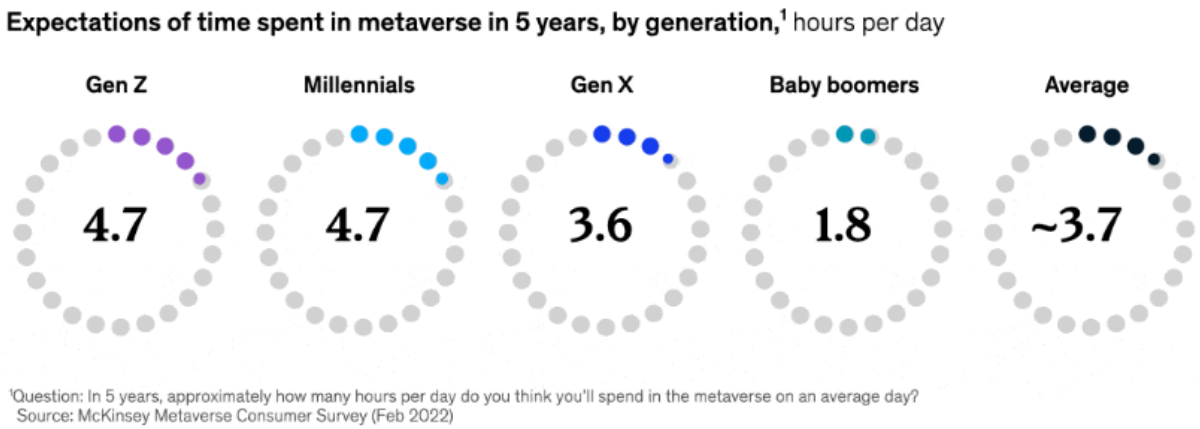
Enscape is a real-time visualization tool and VR plugin that empowers design workflows by turning building models into immersive 3D experiences.

Metaverse

Autodesk is innovating today to enable the world builders of tomorrow.

Autodesk terminology of metaverse: **Immersive virtual environments where innovators collaborate to create, simulate, and iterate** It is a constantly evolving space.

If it fulfills its potential, the metaverse will create new economies, unleash talent, and jump-start efficiency. By any definition, Autodesk is already in the metaverse space. For four decades we've equipped our customers with increasingly immersive and collaborative technology. We are one of the most influential providers of virtual experiences through our 3D content and authoring tools. Our cloud platform provides the technology, capabilities, and services to enable virtual and locationbased experiences, and the integrations to connect those digital experiences with their physical real-world counterparts. We are actively coordinating with other metaverse platforms to create open standards that enhance portability and integration. In the coming years, the metaverse will move from inconsequential to imperative, from an imaginary plaything to a business necessity. The Autodesk platform coupled with our commitment to open standards is the foundation that will allow innovators to create real value for their businesses. As customers create for metaverses, they will also use it to inform the physical world.



Exploration of XR gear

Some common XR terminology

- heads up display (HUD)
- Full dive VR
- FOV (Field of View)
- DoF (3 DoF, 6 DoF) Degrees of freedom
- Mura effect (uneven displays)
- "screen-door" effect
- 360 video

VR Technology

There are over 171 million VR users worldwide. The virtual reality industry has changed extensively since the days of slotting a smartphone into a Google Cardboard – a headset that was literally made from cardboard. Now performance, display resolution and field of view (Fov) have both improved, and there's more VR content than ever before.

Top picks in VR

Oculus Quest 2/Meta Quest 2 - Best Standalone Experience

pros

- **No cables required**
- **Sharp display**
- Optional PC tethering with accessory cable

cons

- **Short battery life**

Quest 2 is for anyone interested in playing in virtual reality. it's inexpensive, has plenty of games and software, and you don't need to plug it into anything except to charge its battery. it's easily the most accessible vr headset, and so it's one we can readily recommend to almost anyone.

HTC Vive Pro 2 - Best for the Highest-Resolution VR

pros

- **The best resolution for VR gaming**
- Smooth motion tracking
- works with valve index controllers

cons

- Expensive
- Doesn't include necessary base stations or controllers

Sony playstation vr/vr2 - best for playstation gamers

pros

- immersive vr experience.
- works with non-vr apps and games.
- motion control support.
- low cost of entry compared with pc-based headsets.

cons

- requires playstation camera, which is not included.
- slightly less powerful than its main competitors.
- some motion-tracking hiccups when playing in brightly lit rooms.

Valve index vr kit - best for revolutionary controllers

pros

- immersive, finger-tracking controllers
- high, 120hz refresh rate delivers smooth motion
- lots of vr software available on pc via steamvr

cons

- expensive
- occasionally frustrating tethered design

HP reverb g2 - best for simple, tethered vr

pros

- high resolution for the price
- comfortable headset and controllers
- works reliably with steamvr

cons

- camera-based tracking has occasional hiccups

- much more expensive than the oculus quest 2, even when factoring the optional cable for pc tethering
- windows mixed reality is almost completely dead as a vr platform

Top picks – VR headsets

Oculus Quest 2/Meta Quest 2

Sony PlayStation VR/VR2

Valve Index VR Kit

HTC Vive Pro 2

HP Reverb G2

Hear from our Autodesk VR power users!

"I use both Valve Index and Oculus Quest 2 pretty consistently. I highly recommend an upgrade on the base strap on Quest 2 for an improved VR fitness experience"

Jonathan Zink

Software Engineer, AEC Design

"I have found that I like 'best' the Meta/Oculus Quest 2 This comes after trying:

- *Oculus Go*
- *Oculus Quest 1*
- *Oculus Rift S*
- *HTC Vive Pro"*

Matthew Spremulli

Research Program Manager, PSET

"Here's my list of favorite tools...

- *Microsoft Maquette on a tethered Meta Quest 2 (with Link cable)*
- *Google Blocks on an Meta Quest 2 with Link cable*
- *ShapesXR on Quest 2*
- *Google Tilt Brush on Quest 2."*

Michelangelo Capraro

Experience Design Architect

Top picks in AR

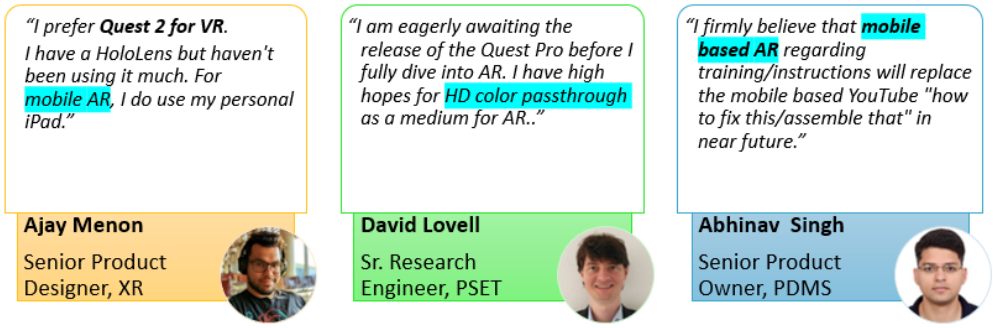
Fitting all of this technology into a small space that looks as close to real sunglasses is hard. With this marvelous technology you can interact with **holograms** and manipulate them to your own advantage.

Microsoft HoloLens - best for collaboration
Pros: immersive, ergonomic, instinctual and untecthered.

Google Glass – best wearable for light weight, instant connection with team
Pros: transparent display, hands-free work real-time collaboration

Lenova Smart Glass – safe for your data
Pros: Light-weight, PC compatible, customize fit, custom workspace creation

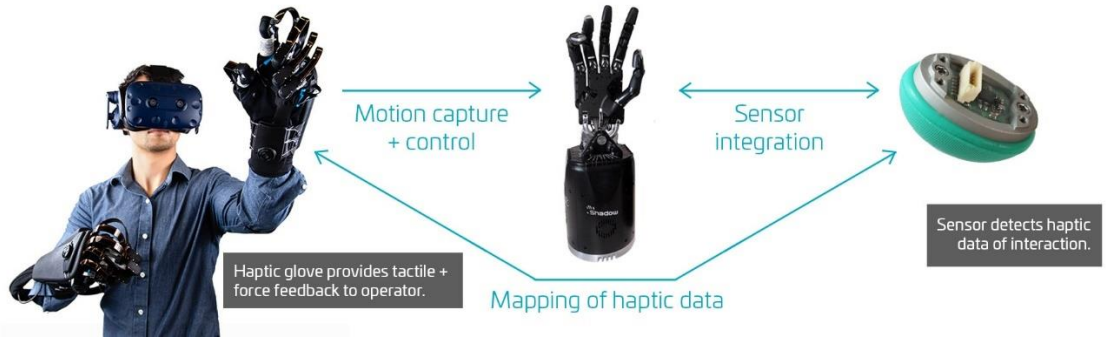
Vuzix Blade – best wearable for remote access
Pros: autofocus HD camera, integrated speakers, wireless, full UV, ANSI Z87.1 certification



Unique XR Accessories

Haptic Gloves

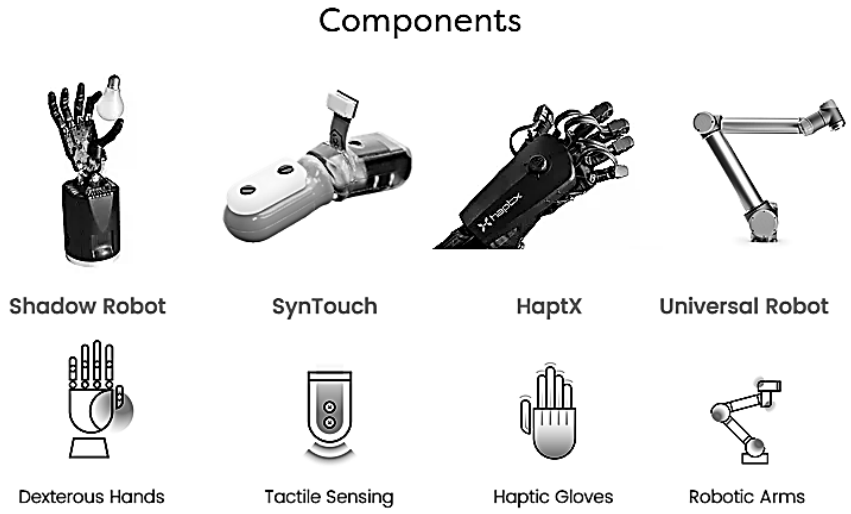
HaptX Gloves DK2 lets you feel digital objects. HaptX Inc. wants pro grade VR system users to feel the virtual environment in the real world.



Tactile Telerobot

An operator wearing the haptic gloves controls the robotic hands and arms at a safe distance from a few feet to a few planets away.The robot hand movements mimic the user's hand and arm movements, allowing for precise material handling and task completion.Sensors on the robotic hand relay touch sensation back to the operator through the haptic gloves. The user can feel what the robot is touching and the system harnesses biological reflexes and spatial awareness for optimized control. The gloves brings your hands into your games.

- **High dexterity** - Capture of full range of hand motion
- **Precise control** - Sub-millimeter motion capture accuracy
- **Remote operation** - Control robot from anywhere in the world



Source: Tangible-research

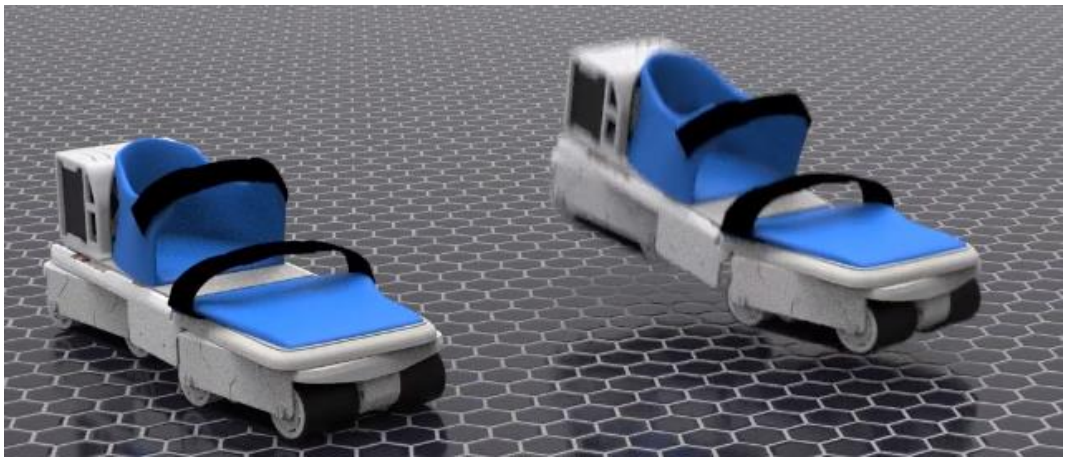
Logitech Chorus VR Off-Ear Headset for Meta Quest 2

Designed for Gaming and VR Fitness, Lightweight, Open air immersive Audio, flip to Mute, USB-C passthrough – White. Here is a headset designed for VR gaming and fitness.

Source: Logitech

VR Smart shoes

Feels similar to a Gym Treadmill, VR shoes give you the sense of stepping on the ground in virtual spaces and keeps the user within a small space using omnidirectional positional correction technology.

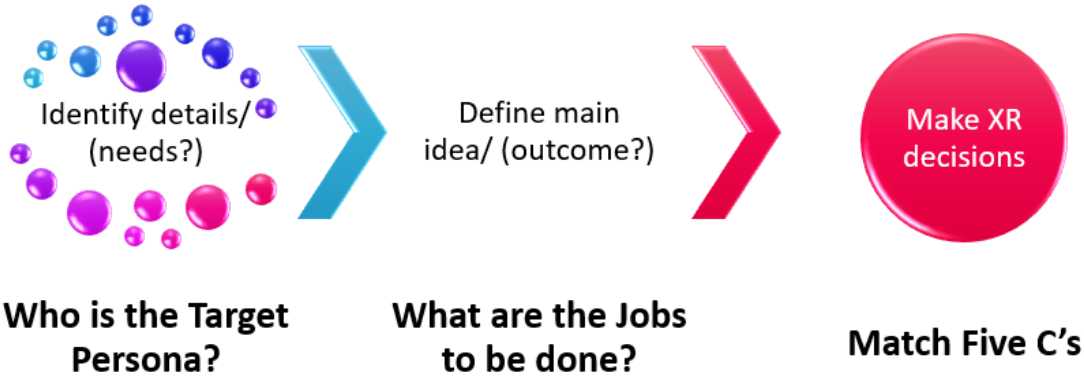


Source: VR smart shoes, Freeaim

Tony Stark's Buyer's Guide

Buyers' guide is not a manual, but rather a tool to make you think and customize it for your needs.But where do you start? Follow the 3 step process.

Three Step Process



Step 1: Identify your Target Persona

Fill gaps for Multiple Personas in the ecosystem: Fill gaps for both target as well as multiple personas in the ecosystem

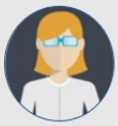
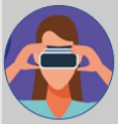
Embedded ecosystem

- Design professionals
- AECO professionals
- Broad range of users
- Client
- Site developers
- Facilities
- Building operations
- Daily life of a designer
- Executives
- Solution Buyers
- End-Users

Step 2: Map your jobs to be done

2a. What are the jobs to be done? AEC (apply process for each persona that you want this solved for) Jobs to be done helps to capture a common understanding of the problem space in general.This step is to Identify pain points

2b. Jobs to be done across phases (Examples: AEC)

SITUATION	MOTIVATION	EXPECTED OUTCOME	PERSONAS
When I need to collect site data from **various resources** EARLY STAGE	I want to **consolidate data** in a usable format	So I can **avoid rework** and validate data	 SITE ENGINEER
When I need to design based on slopes I need **additional cross sectional views** DESIGN , BUILD PHASES	I want to get the site grading right to **improve accessibility** and eliminate errors early on.	So I can to **balance both utility and function** of built spaces	 ARCHITECT
When I need to work on **multiple software** to create advanced visualization client design reviews ALL PHASES	I want to be able to **automate the process** of creating visualizations whenever I need them	So I can generate illustrations to print or use for **quick immersive visualizations**	 VR TECHNOLOGIST

Above listed are 3 personas as related to situational challenges in different phases and identifies expected outcomes from their motivations. Once the map is ouitlined then it can linked back the insights with the pain points identified.

2c. Jobs to be done across verticals (Examples: AEC)

SITUATION	MOTIVATION	EXPECTED OUTCOME	PERSONAS
When I need to **express my design idea** SINGLE FAMILY	I want to sketch in free form to the designer	So I can **communicate my ideas** and requirements early on	 HOME OWNER HOME RENOVATOR
When I need to design based on **spatial constraints** OFFICE DESIGN	I want to layer information (parcels, height limits etc.) to site early on	So I can to **design high rise office** spaces that are in compliance with local regulations	 WORKPLACE DESIGN ARCHITECT FACILITIES PLANNER
When I need to design for **specific cultural projects** CULTURAL	I want to be able to **integrate and position** cultural elements in design concepts	So I can generate concepts considering location and other **environmental factors**	 TOWN PLANNER URBAN DESIGNER

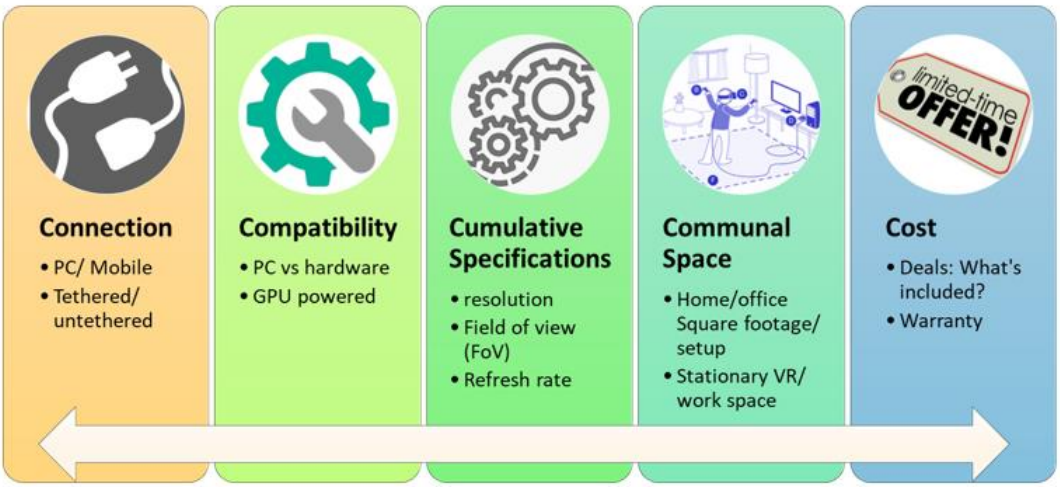
Next step of the process was to repeat the same framework for personas across verticals Develop a custom journey maps to capture a common understanding of the problem space.

2d. Dream team, skill-set match

Have a dream team ready. Start small with in house skills. Identify the value risk with reference to your budget.Next identify the usability risk.

1. Pick the right technologies when designing solutions for various XR applications to create content for different industries.
2. Consider ease of Installation of Autodesk application
3. Explore XR plugin and partner solutions
4. Platform compatibility (Windows, Mac)
5. Usable formats, export/import options
6. Determine accuracy of results, speed, reliability, SWOT analysis
7. Discover options to explore and innovation

Step 3: Make XR decisions before you buy



Identify needs vs wants and determine the Value you get for the price you pay

- Autodesk + Plugin
- Check source of plugin/tool
- Check Pricing factor, Full version availability

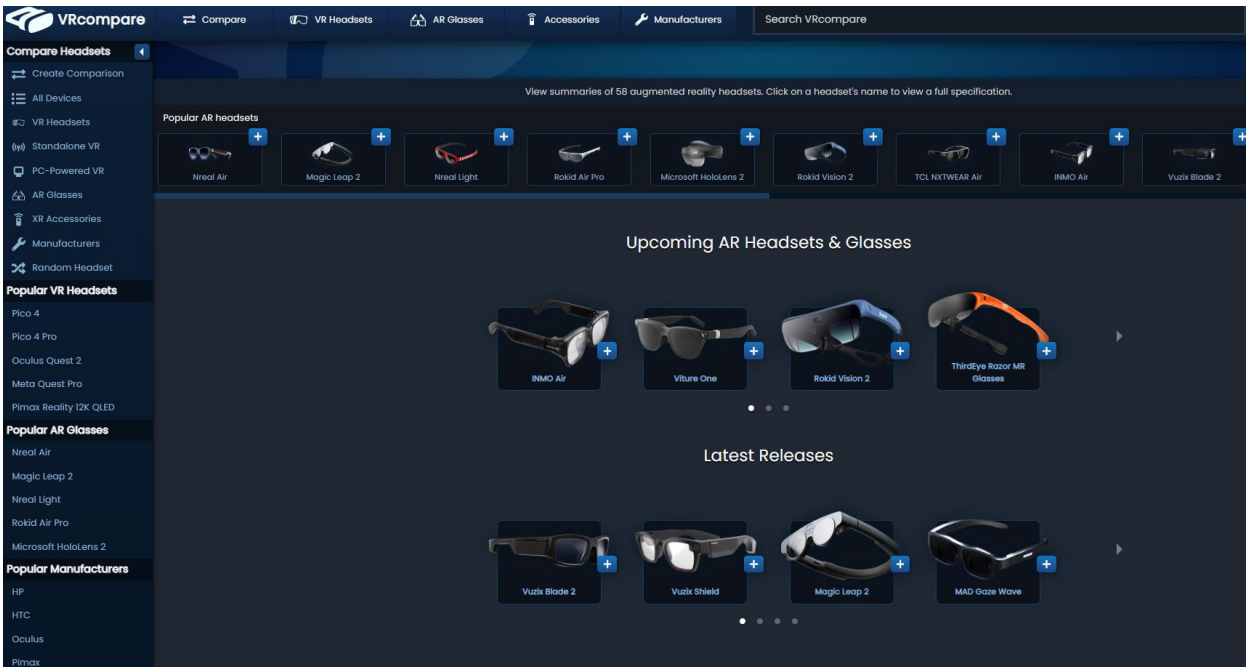
Does it get the 'job' done?

Comparsion Charts

THE WILD
IMMERSIVE COLLABORATION FOR TEAMS

2022 Business VR Headset Comparison Chart (Q1)

	Meta Quest 2	Pico Neo 3	HP Reverb G2	Valve Index	Vive Pro 2	Vive Pro
						
Official Support in The Wild	☑	☑	☑	☐	☐	☑
Resolution / Eye	1832 x 1920	1832 x 1920	2160x2160	1440x1600	2448 x 2448	1440x1600
Refresh Rate (HZ)	90/120	90	90	144	120	90
Field of View	100°	98°	114°	130°	120°	110°
Weight	503g	620g	544g	570g	850g	563g
Tracking	Inside-out	Inside-out	Inside-out	Base Stations (more equipment = more precise hand tracking)	Base Stations (more equipment = more precise hand tracking)	Base Stations (more equipment = more precise hand tracking)
Type	**Standalone** (no wires, less powerful processor) + **option to wirelessly stream or tether** to a PC with a cable	**Standalone** (no wires, less powerful processor) + **option to wirelessly stream** to a PC	**Tethered** (wired to your PC, more powerful, can run larger models)	**Tethered** (wired to your PC, more powerful, can run larger models)	**Tethered** (wired to your PC, more powerful, can run larger models)	**Tethered** (wired to your PC, more powerful, can run larger models)
Price	$299	💼 $699	$599	$999	$1399 | 💼 $1599	$1199 | 💼 $1399
Summary	A great standalone headset for personal or business use. What you lose in processing power you gain in easy setup and freedom of movement. AirLink and the Link cable makes this a great option for running larger models as well.	A fantastic Enterprise standalone (or optional PC-streaming) headset focused on privacy and control, with ability to deploy software through Multiple Device Managers.	An affordable, high-res, tethered headset for running large models from your PC.	A top-of-the-line gaming headset. Base stations and wires require more setup and configuration, but create a smooth and powerful experience in-headset.	A top-of-the-line gaming headset. Base stations and wires require more setup and configuration, but create a smooth and powerful experience in-headset.	An older but still powerful gaming headset. Base stations and wires require more setup and configuration, but create a smooth and powerful experience in-headset.



Source: VR Compare

Resources

VR/AR compare
Top 10 VR Headsets 2022
https://www.vr-compare.com/ar
https://vr-expert.com/upcoming-vr-and-ar-headsets-for-2022-and-beyond/
https://www.zdnet.com/article/best-ar-glasses/
https://www.insight.com/en_us/shop/product/njx-00001/microsoft/njx-00001/microsoft-hololens2-enfres-uscanada-hdwr-commercial/
https://www.lifewire.com/apple-glasses-price-specs-news-5087603
https://www.techradar.com/news/the-best-vr-headset
https://blog.techviz.net/best-ar/vr-headsets-for-engineers-in-2022
https://developer.oculus.com/blog/open-source-release-of-rift-dk2/
https://www.tomsguide.com/search?searchTerm=ar
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