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# XR and Sustainability

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**/thoughtworks**

Creating extraordinary impact together

[thinkuldeep.com](http://thinkuldeep.com)



# Highlights

## Let's understand relationship in XR and sustainability

XR tools and technology adaptation is growing, as evolution in hardware, software and network speed. It comes with some benefits as well as concerns for sustainable business. Let's understand it.

Intro to XR

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Sustainable use-cases for XR

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Sustainability concerns of XR

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What's next?

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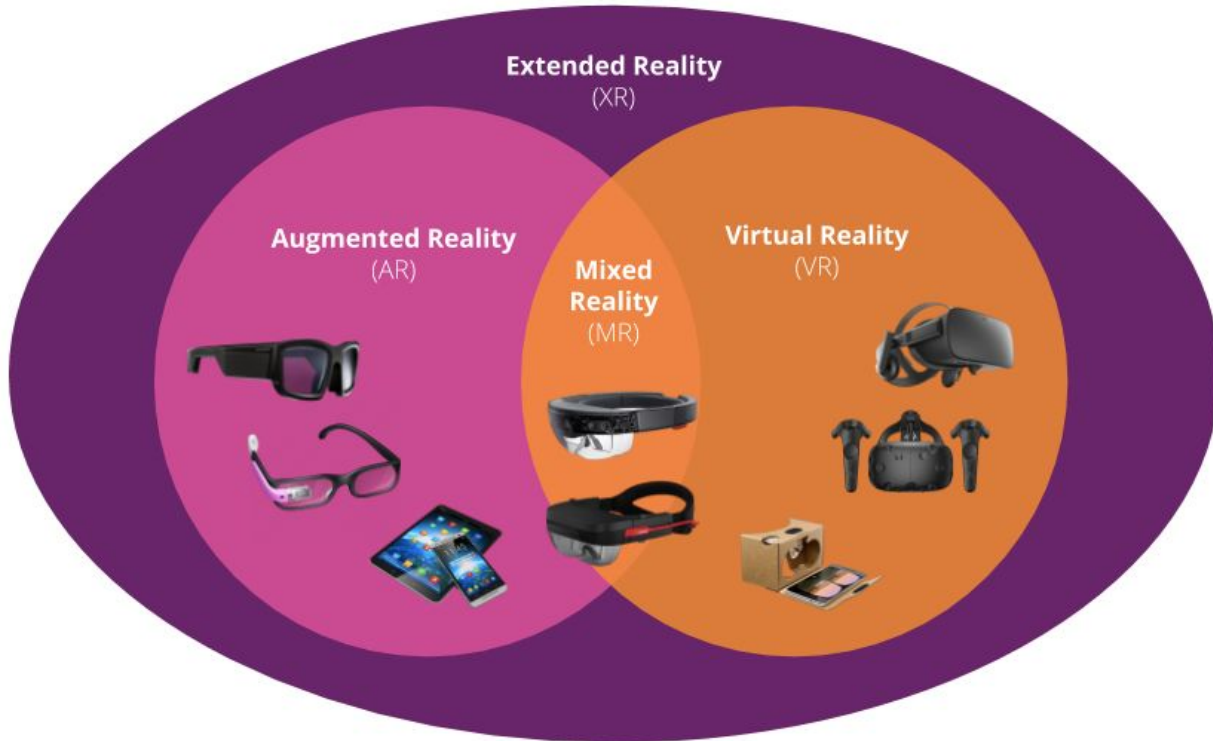


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# XR and Sustainability - The Definition Part

# eXtended Reality (XR)

Understanding multiple ways of extending the reality



AR - Augmented reality (AR) overlays digital content in the live environment.

VR - A complete immersive experience that shuts out the physical world and takes into the virtual world.

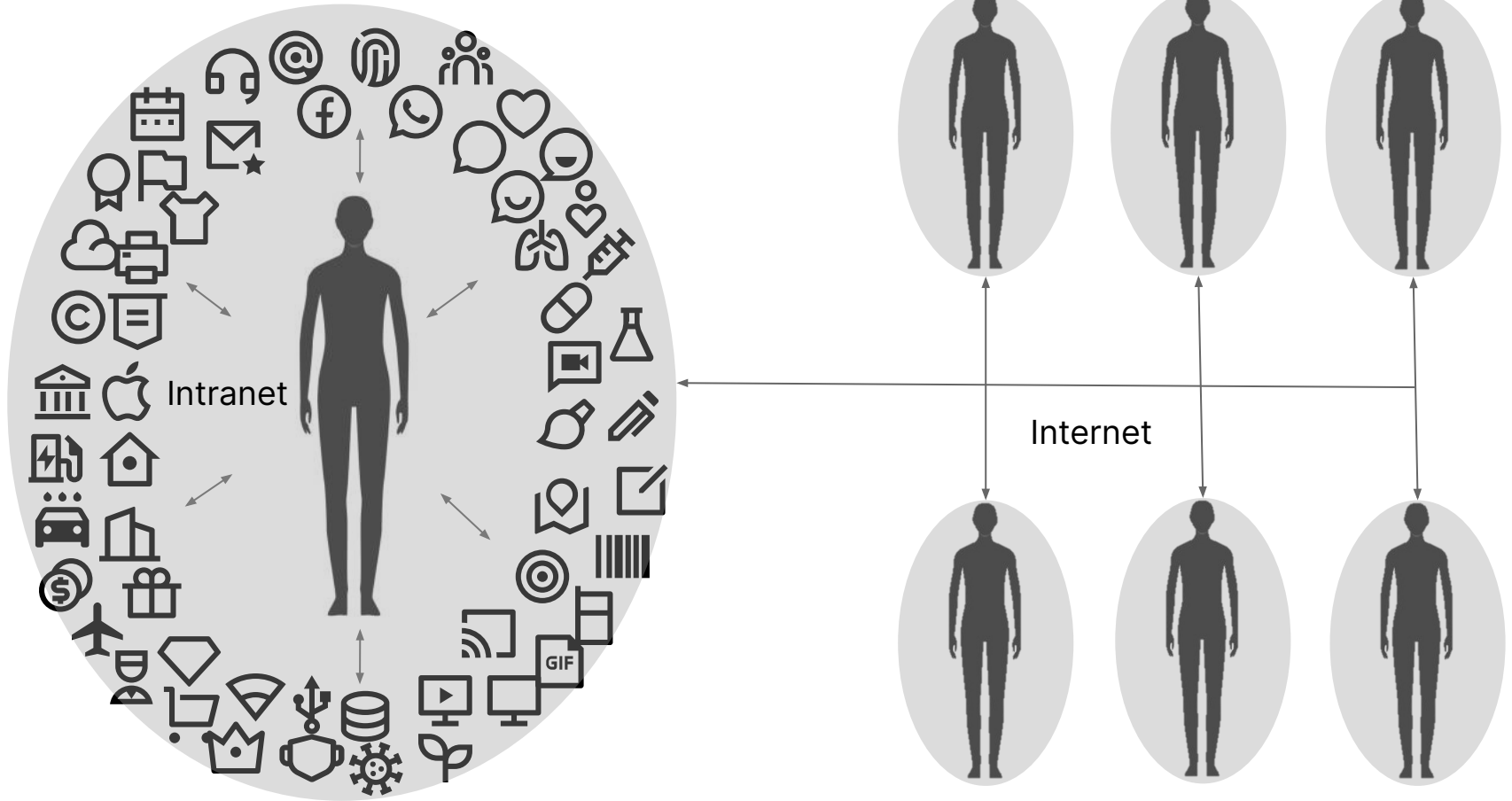
MR - Combination of both AR and VR, where physical world and digital objects interact.

Mobile XR – AR/VR enabled smart phones/tablets

Web XR – AR/VR enabled web

HUD - Heads up displays, projection based

# “Metadata” and “Internet”



# and the Metaverse

Metaverse is an universe built up on the network of metadata around us and about us. In a universe where the real and fake blur together, photo-realistic avatars are making use of virtual identities, virtual intellectual properties / assets, virtual societies and their own virtual currencies.

**Metaverse is  
Open &  
Independent**

**Metaverse  
is One &  
Interoperable**

**Metaverse is for  
Everyone &  
Self-sustainable**

# Metaverse

Artificial Intelligence

Extended Reality (XR)

Internet Of Things

Augmented Reality (AR)

Virtual Reality (VR)

Mixed Reality (MR)

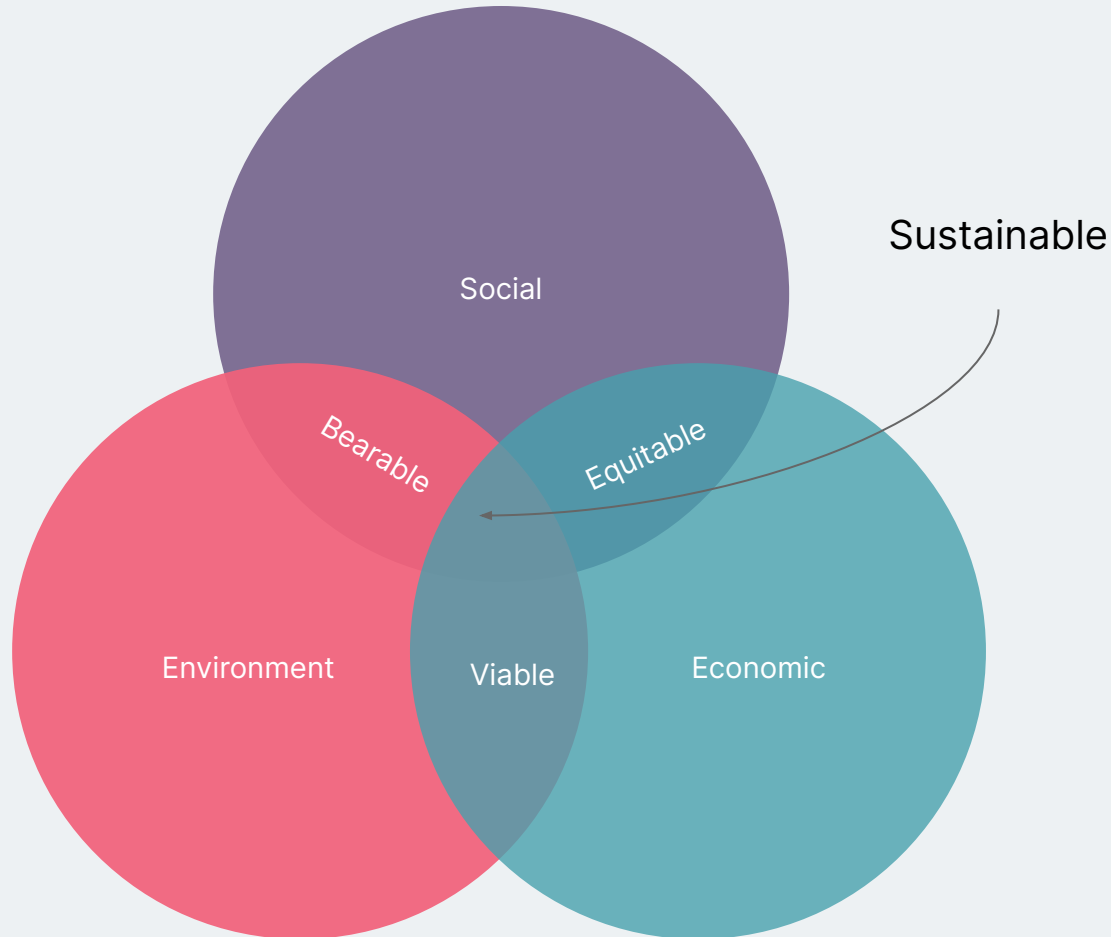


Cloud

Blockchain

5G/6G

# Sustainable Development



## Three pillars :

1. Environmental sustainability,
2. Economic sustainability
3. Socio-political sustainability

The three 'pillars' intersected together to create an equitable economy for the society, while making it viable for the environment, so that it is bearable for the society and thus result in achieving the sustainable development concept - [Source](#)





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# XR and Sustainability - the opportunities part

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# Location agnostics work environment

Work from anywhere or work from nowhere

XR can bring capabilities of the real world and overcome limitations and challenges of real-world.



- Everything Digital, a parallel world
- Infinite and Interoperable Space
- Remote collaboration
- Development at remote places.

- Lesser, lighter hardware
- Lesser power consumption from mobile devices
- Lesser material
- Lesser wastage
- Lesser travel

# Training and Awareness

**Tackling the workforce shortage, and shifting skills, education.**

Onboarding and Training

Working with gadget geeks

New safety and compliance

Record, rewind and correct

Museums, Studios, Schools...

Source : [Future-of-Work-Talent-Crunch-Report](#)



10K baby-boomers reaching retirement age every day for next 19 years, covid19 making it faster



50% companies are facing skilled labour shortage. Covid19 has increased it more.



75% of global workforce will be millennials by 2023



Outdated methods of training and onboarding, schools.



Work complexity is increasing, need to re-invent. Human machine collaboration, simulations.



Workforce safety and compliance requirements. Multi-shift working

# Changing Definition of IP

Buy/Sell/Rent virtual properties, assets

If there is a digital currency, then there would be way to trade the properties. Monetize on the assets. **Content Economy**



Picture credit : <https://www.nicepng.com/>

THE  
**SANDBOX**  
WELCOME TO THE METAVERSE

Visit [www.sandbox.game](http://www.sandbox.game) to learn more

- Buy land, build house, and sale or may be rent
- Concerts, events, conferences
- Allow advertisements, and get paid
- Different platforms being built - buy Taj, monuments and more..
- NFT (Non-Fungible Token) - Viable solution for artists to create financial value from the digital artwork they produce. % royalty on every sale of art.

# Meet and Greet

## Beyond the reality

Meet and greet in metaverse/XR within capabilities of real world and beyond it... it can bring the real power of being human.



- Meeting with the ones who are no more
- Ability for specially abled
- It DOSEs - Dopamine, Oxytocin, Serotonin, and Endorphins - Meeting family.
- Virtual therapy, pain less, or just as as Drug.
- Virtual social identity(ies)



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# XR and Sustainability - the concerning part

# Technological Evolution comes a cost

## Balancing Game

### Carbon Neutral Business



E-Waste



Carbon Positive Infrastructure... -  
Blockchain, Cloud XR, 5G/6G



Network speed at cost of power  
consumption



Diversity and Inclusion - some people  
may be left out.



Maturity takes time - "solution waiting to  
problems stage"

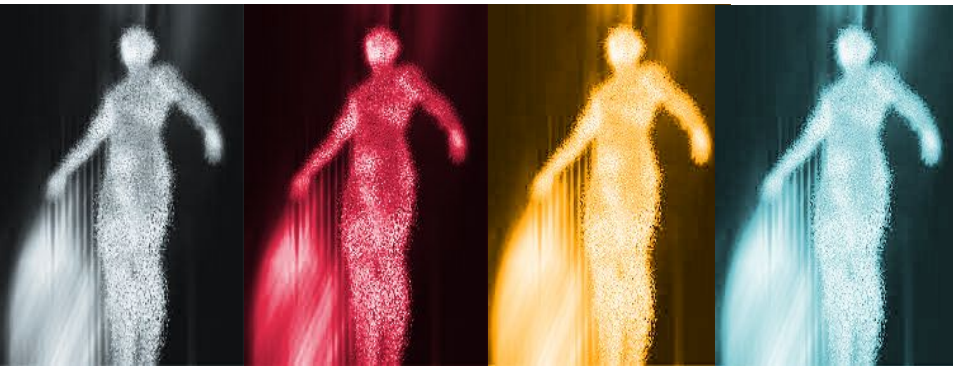


New ways of information exposures, and  
may be more vulnerable.

# Identity and Privacy

## Future identify is at Risk

Safeguarding identify would be difficult part, without strong laws and regulations. It is easy to impersonate people when identity is based on interests. People may want to keeps multiple social profiles and personas.



Someone represent you in your office, society, without your knowledge.



Someone accessing your property/assets without your knowledge



Social media trials, by the time truth prevails, damage happen?



What is real or fake?



Need of Virtual Universal ID



Attention from government, institutions, enterprises to come together and safeguard my future identity.



# Mind Blowing

## Configuring the mind



Pic Credit : www.medicaldaily.com

XR all about the immersive experience and we will be going into internet, into people's imagination, and mind.



DOSE - Setting the chemical equations



As drug - A [Legal Heroin](#)? Addictions.



You may be a king/queen of your metaverse, why would you want to come out and live in real world?



Metadata explode - accessing information lying in mind. BCI and more...



Socio-Political Influence



What are the legal options?



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# XR and Sustainability - Our responsibility

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# Stay Invested

## Adapt Technology Ethically

In long run, **not using these** or staying away from them would **not** be **an option**. No matter how scary future looks, it is coming closer than we think.

Need more standards and regulations for hardware, network and software makers.

- XR Safety Initiative ([xr.si.org](https://xr.si.org))
- [IEEE SA - XR](#)
- XR Ethics Manifesto



**Awareness** - start using it



**Training** - get ready to build for it.



**Co-create** right solution. Innovate and solve the concerning parts.



Contribute - Build practices, standards and contribute share with **communities**.



**Join hands** with enterprises and governments, institutions, systems and people.



**Play** your part, and save the future.



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# Thanks and Keep in touch

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