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March 4th-8th, 2024

NAVIGATING THE ETHICAL LANDSCAPE OF XR: BUILDING A NECESSARY FRAMEWORK

6TH OF MARCH

Prof. Eleni Mangina

Vice - Chair:: **IEEE GLOBAL INITIATIVE ON ETHICS OF EXTENDED REALITY**

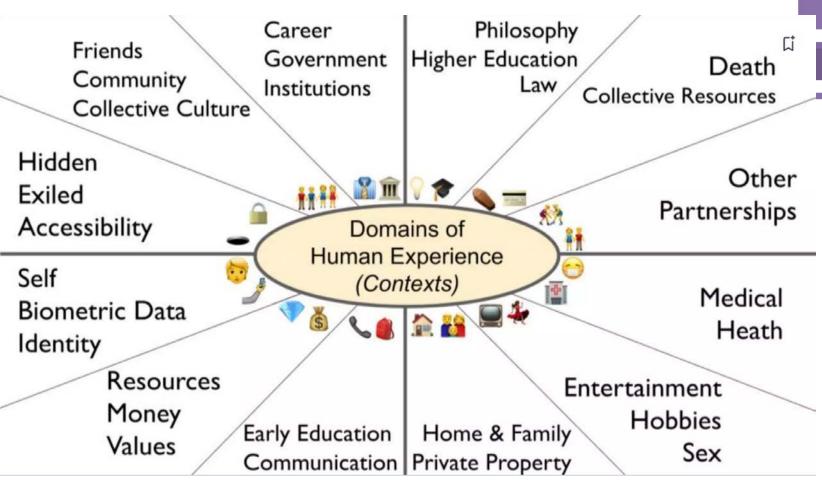Chapter Leader: **EXTENDED REALITY (XR) ETHICS IN EDUCATION**

IEEE WG Chair: **PAR P7016.1: Standard for Ethically Aligned Educational Metadata in Extended Reality (XR) & Metaverse**

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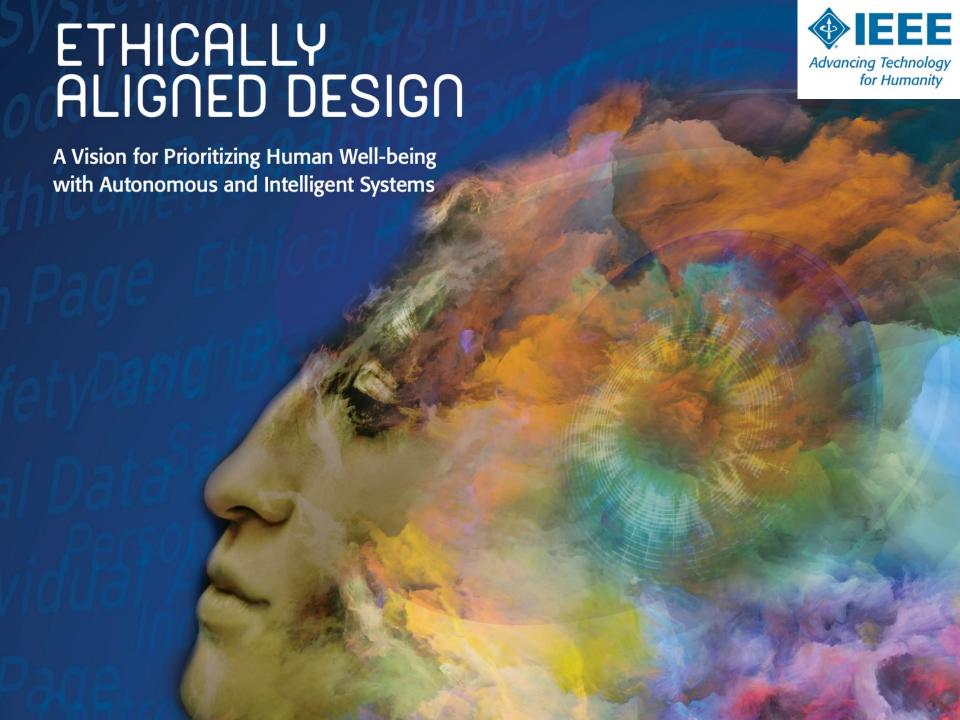
WHY DO WE NEED ETHICS IN XR DEVELOPMENT?

Domains of Human Experience (Contexts)

Friends / Community / Collective Culture

Career / Government / Institutions

Philosophy / Higher Education / Law

Death / Collective Resources

Hidden / Exiled / Accessibility

Other / Partnerships

Self / Biometric Data / Identity

Medical / Heath

Resources / Money / Values

Entertainment / Hobbies / Sex

Early Education / Communication

Home & Family / Private Property

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XR Manifesto

ETHICALLY ALIGNED DESIGN

A Vision for Prioritizing Human Well-being
with Autonomous and Intelligent Systems

SOCIAL INTERACTIONS

ISSUE 1: WHAT HAPPENS TO CULTURAL INSTITUTIONS IN A MIXED REALITY, AI-ENABLED WORLD OF ILLUSION, WHERE GEOGRAPHY IS LARGELY ELIMINATED, TRIBE-LIKE ENTITIES AND IDENTITIES COULD SPRING UP SPONTANEOUSLY, AND THE NOTION OF IDENTITY MORPHS FROM PHYSICAL CERTAINTY TO VIRTUALITY?

TEAMLAB'S "BORDERLESS" EXHIBIT AT THE TOKYO DIGITAL ART MUSEUM. CR: TEAMLAB

SOCIAL INTERACTIONS

ISSUE 2: WITH ALTERNATIVE REALITIES AT REACH, WE WILL HAVE ALTERNATIVE WAYS OF BEHAVING INDIVIDUALLY AND COLLECTIVELY AND PERCEIVING OURSELVES AND THE WORLD AROUND US. THESE NEW ORIENTATIONS REGARDING REALITY COULD ENHANCE AN ALREADY OBSERVED TENDENCY TOWARD SOCIAL RECLUSIVENESS THAT DETACHES MANY FROM OUR COMMON REALITY. COULD SUCH A SITUATION LEAD TO AN INDIVIDUAL OPTING OUT OF "SOCIETAL ENGAGEMENTS?"

SOCIAL INTERACTIONS

ISSUE 3: THE WAY WE EXPERIENCE (AND DEFINE) PHYSICAL REALITY ON A DAILY BASIS WILL SOON CHANGE

SOCIAL INTERACTIONS
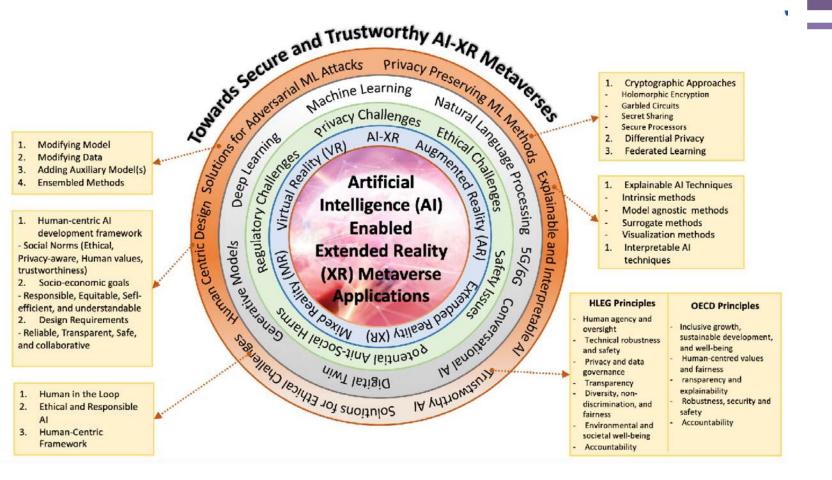
ISSUE 4: WE MAY NEVER HAVE TO SAY GOODBYE TO THOSE WHO HAVE GRADUATED TO A NEWER DIMENSION

META NEWS: DIGITAL LIFE CHEATS DEATH IN THE METAVERSE **(2023)**

SOCIAL INTERACTIONS

ISSUE 5: : A/IS, ARTIFICIAL CONSCIOUSNESS, AND AUGMENTED/MIXED REALITY HAS THE POTENTIAL TO CREATE A PARALLEL SET OF SOCIAL NORMS ?

QAYYUM, A., BUTT, M.A., ALI, H., USMAN, M., HALABI, O., AL-FUQAHA, A.I., ABBASI, Q.H., IMRAN, M.A., & QADIR, J. (2022). SECURE AND TRUSTWORTHY ARTIFICIAL INTELLIGENCE-EXTENDED REALITY (AI-XR) FOR METAVERSES. *ACM COMPUTING SURVEYS*.

CASE STUDY

EXAMPLE OF ETHICAL DILEMMAS IN XR DEVELOPMENT

LESSONS LEARNED AND BEST PRACTICES

ARETE H2020
AR PILOTS FOR PRIMARY SCHOOLS IN EU

Why Ethics?

Pilot 1

Using Augmented Reality to Facilitate Teaching English Literacy Skills

READ MORE ➜

Pilot 2

Augmented Reality as Efficient Tool for STEM Information Retention

READ MORE ➜

Pilot 3
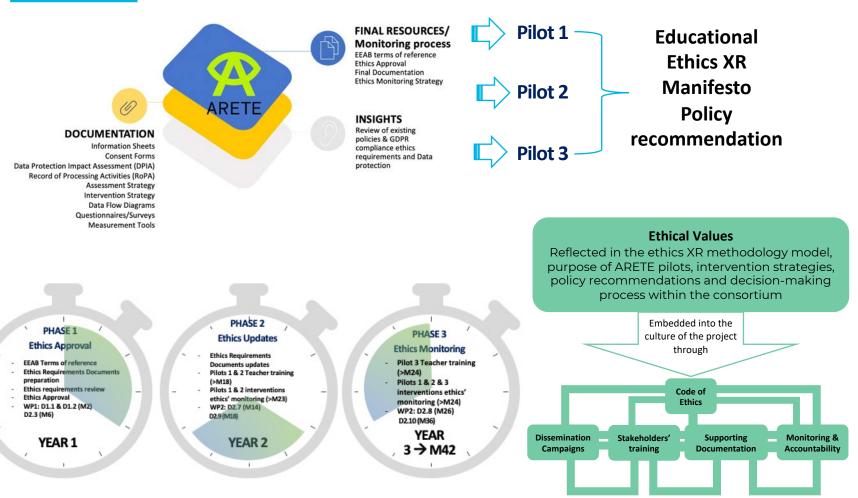
Augmented Reality for promoting Positive Behaviour Intervention and Support (PBIS)

READ MORE ➜

ARETE H2020 PROJECT (METHODOLOGY)

DOCUMENTATION
Information Sheets
Consent Forms
Data Protection Impact Assessment (DPIA)
Record of Processing Activities (RoPA)
Assessment Strategy
Intervention Strategy
Data Flow Diagrams
Questionnaires/Surveys
Measurement Tools

FINAL RESOURCES/ Monitoring process
EEAB terms of reference
Ethics Approval
Final Documentation
Ethics Monitoring Strategy

INSIGHTS
Review of existing policies & GDPR compliance ethics requirements and Data protection

Pilot 1
Pilot 2
Pilot 3

Educational Ethics XR Manifesto Policy recommendation

PHASE 1
Ethics Approval
- EEAB Terms of reference
- Ethics Requirements Documents preparation
- Ethics requirements review
- Ethics Approval
- WP1: D1.1 & D1.2 (M2) D2.3 (M6)

YEAR 1

PHASE 2
Ethics Updates
- Ethics Requirements Documents updates
- Pilots 1 & 2 Teacher training (>M18)
- Pilots 1 & 2 interventions ethics' monitoring (>M23)
- WP2: D2.7 (M14) D2.9 (M18)

YEAR 2

PHASE 3
Ethics Monitoring
- Pilot 3 Teacher training (>M24)
- Pilots 1 & 2 & 3 interventions ethics' monitoring (>M24)
- WP2: D2.8 (M26) D2.10 (M36)

YEAR 3 → M42

Ethical Values
Reflected in the ethics XR methodology model, purpose of ARETE pilots, intervention strategies, policy recommendations and decision-making process within the consortium

Embedded into the culture of the project through

Code of Ethics

Dissemination Campaigns | **Stakeholders' training** | **Supporting Documentation** | **Monitoring & Accountability**

H2020 & GDPR Compliance and project monitoring

ETHICAL CHALLENGES IN XR

PRIVACY CONCERNS: DATA COLLECTION, SURVEILLANCE

PSYCHOLOGICAL EFFECTS: ADDICTION, MANIPULATION

PHYSICAL SAFETY: ACCIDENTS, MOTION SICKNESS

CULTURAL AND SOCIAL IMPACT: BIAS, STEREOTYPES, REPRESENTATION

ENVIRONMENTAL IMPACT: ENERGY CONSUMPTION, E-WASTE

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BUILDING AN ETHICAL FRAMEWORK FOR XR

ESTABLISHING ETHICAL GUIDELINES AND STANDARDS

INVOLVING STAKEHOLDERS IN DECISION-MAKING PROCESSES

INCORPORATING DIVERSITY, EQUITY, AND INCLUSION PRINCIPLES

ENSURING TRANSPARENCY AND ACCOUNTABILITY IN DEVELOPMENT

CONTINUOUS MONITORING AND EVALUATION OF ETHICAL IMPLICATIONS

JOIN OUR EFFORTS ON STANDARDS

2019 - 2024

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THE IEEE GLOBAL INITIATIVE ON ETHICS OF EXTENDED REALITY

About the Activity

The following excerpt from the chapter on Extended Reality in A/IS that is part of *Ethically Aligned Design, First Edition* illustrates the need for this initiative:

Humans interpret the world through multiple lenses, determined by both culture and environment, which form the basis for human bias and deeply influence how people interpret their relationships and sense of self. The nature of these lenses and how reality is experienced has dramatically evolved with the introduction of digital technologies and easy access to information via the web. Our perspectives are profoundly influenced not only by the cultural values of a global population, but by the underlying tracking technologies fueling the economic underpinnings of the web.

The growing prevalence of augmented and virtual environments is set to extend our collective human cognizance. Our sense of physical identity, time, and agency will become subject to entirely new paradigms, where the gateways to these experiences might be controlled by interests other than that of ordinary citizens. The autonomous and intelligent systems (A/IS) backbone enabling real-time personalization of any end-users' Extended Reality (XR) world raises a host of ethical and philosophical questions about the collection, control, and exploitation of user data within these ecosystems. As these capabilities move from external headsets into much subtler, integrated sensory enhancements (and embedded or implanted devices) the stakes can become perilous.

Contacts

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Outputs of the Activity

Metaverse and Its Governance

Extended Reality (XR) Ethics and Diversity, Inclusion, and Accessibility

Business, Finance, and Economics

Extended Reality (XR) Ethics in Medicine

The IEEE Global Initiative on Ethics of Extended Reality (XR) Report–Extended Reality (XR) Ethics in Education

Social and Multi-User Spaces in VR: Trolling, Harassment, and Online Safety

Who Owns Our Second Lives: Virtual Clones and the Right to your Identity

Extended Reality (XR) and the Erosion of Anonymity and Privacy

EXTENDED REALITY (XR) ETHICS IN EDUCATION

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IEEE

42 **Recommendations**

2024 - 2027

IEEE.org | IEEE *Xplore* Digital Library | IEEE Standards | IEEE Spectrum | More Sites   eTools

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P7016.1

Standard for Ethically Aligned Educational Metadata in Extended Reality (XR) & Metaverse

Active PAR

Home > Projects > Standard for Ethically Aligned Educational Metadata in Extended Reality (XR) & Metaverse

This standard defines a high-level overview of a conceptual data schema for a metadata instance based on ethics concepts for a learning object utilized within XR systems and Metaverse applications. This standard does not aim to define whether procedures and operations as presented through the Metaverse are ethical or not. This standard does not involve evaluation of the ethical value of learning content objects. Use case examples of the conceptual data schema are defined. This standard also describes a high-level ethical design methodology of learning objects for XR and the Metaverse applications, using the IEEE Std 7000 applied ethical approach.

Sponsor Committee	SSIT/SC - Social Implications of Technology Standards Committee
	Learn More About SSIT/SC - Social Implications of Technology Standards Committee >
Joint Sponsors	CTS/MSC
	C/LT >
Status	Active PAR
PAR Approval	2023-03-30 >

P7016

Standard for Ethically Aligned Design and Operation of Metaverse Systems

METAVERSE ETHICS MATRIX (P7016) – HIGH LEVEL ETHICAL ASSESSMENT MATRIX

Based on :
Shahriari, K., & Shahriari, M. (2017, July). IEEE standard review—Ethically aligned design: A vision for prioritizing human wellbeing with artificial intelligence and autonomous systems. In *2017 IEEE Canada International Humanitarian Technology Conference (IHTC)* (pp. 197-201). IEEE.
https://standards.ieee.org/industry-connections/ec/ead-v1/
https://publicintelligence.org/quickethics/

METAVERSE ETHICS MATRIX (P7016) – HIGH LEVEL ETHICAL ASSESSMENT MATRIX

Step 1: Ethically Aligned Design Metaverse Universal Human Values General Principles Validation	Validated	Human Rights	Well-being	Data Agency	Effectiveness
		Transparency	Accountability	Awareness of Misuse	Competence
	Not Validated	Human Rights	Well-being	Data Agency	Effectiveness
		Transparency	Accountability	Awareness of Misuse	Competence
		Risk Evaluation			

Based on : Shahriari, K., & Shahriari, M. (2017, July). IEEE standard review—Ethically aligned design: A vision for prioritizing human wellbeing with artificial intelligence and autonomous systems. In *2017 IEEE Canada International Humanitarian Technology Conference (IHTC)* (pp. 197-201). IEEE. https://standards.ieee.org/industry-connections/ec/ead-v1/

METAVERSE ETHICS MATRIX (P7016) – HIGH LEVEL ETHICAL ASSESSMENT MATRIX

Step 2: Ethically Aligned Design Metaverse / Self-Declaration Data Management / General Principles Validation	Validated	Human Rights	Well-being	Data Agency	Effectiveness
		Transparency	Accountability	Awareness of Misuse	Competence
	Not Validated	Human Rights	Well-being	Data Agency	Effectiveness
		Transparency	Accountability	Awareness of Misuse	Competence
	Risk Evaluation				

Based on : Shahriari, K., & Shahriari, M. (2017, July). IEEE standard review—Ethically aligned design: A vision for prioritizing human wellbeing with artificial intelligence and autonomous systems. In *2017 IEEE Canada International Humanitarian Technology Conference (IHTC)* (pp. 197-201). IEEE. https://standards.ieee.org/industry-connections/ec/ead-v1/

METAVERSE ETHICS MATRIX (P7016) – HIGH LEVEL ETHICAL ASSESSMENT MATRIX

Step 3: Ethically Aligned Design Metaverse / Technical Development / General Principles Validation	Validated	Human Rights	Well-being	Data Agency	Effectiveness
		Transparency	Accountability	Awareness of Misuse	Competence
	Not Validated	Human Rights	Well-being	Data Agency	Effectiveness
		Transparency	Accountability	Awareness of Misuse	Competence

Risk Evaluation

Based on : Shahriari, K., & Shahriari, M. (2017, July). IEEE standard review—Ethically aligned design: A vision for prioritizing human wellbeing with artificial intelligence and autonomous systems. In *2017 IEEE Canada International Humanitarian Technology Conference (IHTC)* (pp. 197-201). IEEE. https://standards.ieee.org/industry-connections/ec/ead-v1/

HIGH LEVEL METAVERSE ETHICAL ASSESSMENT MATRIX TOOLKIT

Step X: Ethically Aligned Design Metaverse xxxxxxxxx General Principles Validation	Validated	???	???	???	???
		???	???	???	???
	Not Validated	???	???	???	???
		???	???	???	???
		Low Risk		High Risk	

Based on : Shahriari, K., & Shahriari, M. (2017, July). IEEE standard review—Ethically aligned design: A vision for prioritizing human wellbeing with artificial intelligence and autonomous systems. In *2017 IEEE Canada International Humanitarian Technology Conference (IHTC)* (pp. 197-201). IEEE. https://standards.ieee.org/industry-connections/ec/ead-v1/

CONCLUSION

CALL TO ACTION: IMPORTANCE OF ETHICAL CONSIDERATIONS IN XR

CO-CREATE FOCUSING ON HUMAN RIGHTS

CONSENT

XI. Friends / Community / Culture

- Diversity & inclusion
- Cultural differences
- Cultural norm conflicts
- Algorithmic bias
- Code of Conduct
- Elements of culture
- Trust & safety social scores
- Harms to society
- Changing social norms
- Social hallucinations
- Weaken implicit racism
- Sustainable communities
- Reducing inequalities
- Social anxiety
- Augmenting other people
- Sharing public sphere
- Context-blind tech
- Stakeholder deliberations
- Data during humanitarian crises
- Extremist indoctrination
- Japanese "hikikomori" & acute social withdrawal
- Sharing biometric data as part of identity expression

X. Career / Government / Institutions

- Enterprise XR Ethics
- Remote work
- Using XR for hiring decisions
- Automation & job displacement
- Conflicts of interest between academia & industry
- Governmental surveillance
- Fourth Amendment
  - Third-Party Doctrine
- Governmental loyalty tests
- Governmental nudging
- Governmental propaganda
- Future of online public space
- Right to augment public space

IX. Philosophy / Higher Education / Law

- Philosophical implications
  - What is reality?
  - What is truth?
  - The virtual vs the real
- Filter bubbles of reality
- Religious manipulation
- XR ethics & design
- Philosophy of privacy
- Neuroethics
- Ethics of human augmentation
- Workforce skills training
- XR's impact on law
- XR as judicial evidence
- What content is illegal?
- Future risks of XR tech
- Terms of conditions
- Algorithmic oversight
- Institutional Review Boards
- International Law
- Human Rights Law
- Longitudinal studies
- Beneficence vs autonomy
- Informed consent

VIII. Death

- Virtual resurrections
- Image rights after death
- Account blocks & permanent bans
- Right to be forgotten
  - Account/data erasure
- Violence & killing in VR
  - Humanoid vs non-humanoid NPCs
- Filtering violent or terrorist content
- Military dual use
- Using VR for torture
- Experiential Warfare
- Autonomous weapons systems & drones
  - Virtual suicide bombing
  - Virtually-mediated extrajudicial killings
- Life-threatening security vulnerabilities

XII. Hidden / Exiled / Accessibility

- Accessibility
  - Render content depending on ability
- Inclusive design
- Truly anonymized avatars
- Re-identifying de-identified PII data
- Combating social isolation
- Temporary & permanent exile of user suspensions
- Prisoner rehabilitation
- Addictive escapism
- Dark spatial web
- Closing technology gap for older generations

VII. Other / Partnerships

- Harassment Prevention
  - Personal Space Bubble
- Assault
- Hostile Conflict Zone
- Information Warfare
- Disinformation
- Deep Fakes
- Identity Theft
- Nudging Behaviors
- Deception
- Virtual Beings
  - Dangers of Anthropomorphic AI
  - Dangers of Synthetic Phenomenology
  - Relationships with AI
- Super Intelligence
- Empathy Machine & Technological Determinism
- Ethics Washing

I. Self / Biometric Data / Identity

- Psychological Impacts
- Embodiment
- Avatar Representation
- Body Perception
- Identity
- Self-Model Changes
- Sensory Experience
- Long-Term Impacts
- Virtual Body Ownership
- Self-Determination
- Context Sensitivity
- Cybersickness
- Biometrically-Inferred Data
- Agency
- Suggested Memories
- Proteus Effect
- Planting Memories
- Modulating Memories
- Affective Computing
- Body Swap
- Mind Plasticity
- Epigenetic Traits

VI. Medicine / Healing

- Do Not Harm
- Detecting Medical Conditions
- Triggering Seizures
- Harm to Mental Health
- Depersonalization / Derealization Disorder
- Out-of-Body Disassociation
- PTSD Treatment/triggering
- Biometrically-inferred info
- Telemedicine privacy
- Health Insurance Portability & Accountability Act
- Autonomy of Healing
- Public health
- Recovered memories of abuse
- XR as a medical device
- False hope of XR's promise
- Mandatory treatments
- Body dysmorphic disorder
- Virtual therapeutics
- Well-being applications
- VR rehabilitation
- VR exercise
- Physiological reactions to Sexual Assault

II. Resources / Money / Values

- Virtual Commerce
- Virtual Goods
- Virtual Economy
- Business Models
  - Surveillance Capitalism
  - Subscription Models
- Who owns data?
- Exporting data
- Pay for Privacy?
- Closed vs Open Ecosystem
- Anti-Money Laundering
- Cryptocurrency
- Blockchain
- Digital Divide
- Economic Disparities
- Neuromarketing
- Advertising as Behavioral Modification
- Attention Economy
- Homomorphic encryption
- Lobbyist Influence of Policy

III. Early Education / Communication / Local Travel

- Minimum Age for VR
- Negative Transference
- Personalized Education
- Family Educational Rights & Privacy Act
- Ability to Mute Others
- Mitigating & Moderating Hate/Dangerous Speech
- Telepresence Fidelity
- Broadcasting Biometrics
- Non-verbal comm norms
- Recording Conversations
- Automatic Audio Transcripts
- BCI Reading Thoughts
- End-to-End Encryption
- Geolocation Tracking
- Navigation Distractions

IV. Home & Family / Private Property / Earth

- Privacy of volumetric scans of your home
- Collective privacy of family in your home
- Spatial doxxing
- Fourth Amendment defines public vs private spaces
  - All of cyberspace is "public"
  - Third-Party Doctrine
- Who can augment?
  - Property rights
- Context of places
  - (e.g. Pokémon at Holocaust Museum)
- Control & modulate perception of environment
- Data security
- Ecological Impact

V. Entertainment / Content Creation / Sex

- Virtual Violence
- Addictive Entertainment
- Hijacking Attention
- The Dopamine Economy
- Escapism
- Game Ratings
- Content Warnings
- Content Moderation
- Children's Online Privacy Protection Rule (COPPA)
- Undermining User Agency
- Media Ethics
- Psychographic profiling of entertainment preferences
- Undermine User Agency
- XR Porn Implications
- Dystopia Narratives
- New forms of immersive storytelling

Central diagram

Domains of Human Experience (Contexts)

- Friends Community Collective Culture
- Career Government Institutions
- Philosophy Higher Education Law
- Death Collective Resources
- Hidden Exiled Accessibility
- Other Partnerships
- Self Biometric Data Identity
- Medical Heath
- Resources Money Values
- Early Education Communication
- Home & Family Private Property
- Entertainment Hobbies Sex

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THANK YOU

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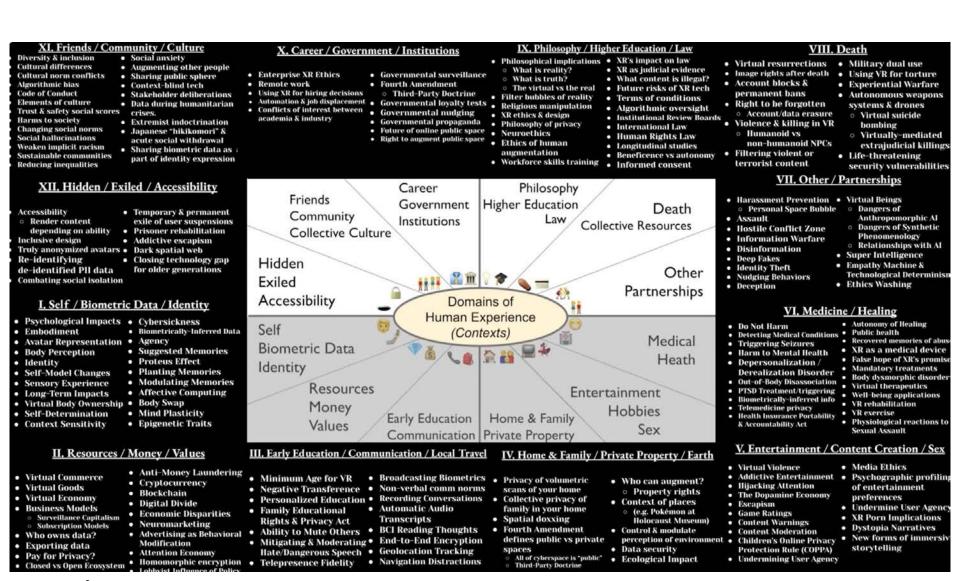
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