Category 3: Historical Technology Shift cards

Historical Technology Shift Cards document technology transitions that have already occurred and that have shaped the present landscape of immersive learning. These cards are retrospective — they describe what happened and analyze its significance for current and future conditions. They serve as grounding references that anchor foresight claims in documented change rather than speculative projection.

- HT: Generative AI Enters the World
- HT: AI inside Immersion
- HT: Natural Embodied Interaction
- HT: Spatial Platforms replace Flat Systems
- HT: Multimodal Learning Analytics
- HT: Mobile Fidelity at Scale
- HT: Post-hype Reality Check
- HT: Affordable XR goes Mainstream

HT: Generative AI Enters the World

2026 HT: Generative AI Enters the World

Card Type	Historical Technology Shift
Series	Immersive Futures Guild — Vision 2035
Layer	1 — Atomic Foresight Object
Status	Active
Confidence	Medium
Workshop	Circle of Scholars — January 2026
Facilitator	Circle of Scholars Workshop Team
Tags	generative-AI | historical | transition | layer1 | ht
Tally.so Form	https://tally.so/r/ilrn-if-ht-genaiworld-2026

The public release of capable large language models and generative image systems between 2022 and 2024 constituted a discontinuous shift in the capability landscape available to immersive learning designers. Content generation, code authoring, scenario scripting, and assessment feedback became accessible through conversational interfaces at a scale and quality threshold that forced the field to reconsider foundational design assumptions. The field is still processing the implications.

Key Drivers / Contributing Conditions:

- Foundation model scaling laws enabling consumer-accessible capability
- OpenAI, Anthropic, Google, and Meta competitive dynamics accelerating public releases
- Rapid integration into existing software tools and development pipelines

Tensions Carried Forward to Part II:

- Which prior research findings about instructional design remain valid when AI can generate instructional content on demand?

Linked Scenarios / Strands: FT: Agentic AI | FT: Real-Time Generative 3D

Ways of Knowing: Tree · Garden · Lantern

PART II — COMMUNITY EVIDENCE & DIALOGUE TRACK | HT: Generative AI Enters the World | H2 2026 — Living

T	COMMUNITY CONTRIBUTION FORM — HT: Generative AI Enters the World Submit case examples, methodological challenges, cultural perspectives, and proposed evidence criteria via: https://tally.so/r/ilrn-if-ht-genaiworld-2026

Part II — Scope and Instructions
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Contribution categories: Case Example | Methodological Challenge | Cultural/Community Perspective | Proposed Evidence Criterion
Ways of Knowing accepted: Tree (evidence) | Garden (practice) | Lantern (futures)

Tensions Open for Community Response:

- Which prior research findings about instructional design remain valid when AI can generate instructional content on demand?

Contributor / Date	Category	Way of Knowing	Contribution Summary
[Awaiting contributions — form opens July 1, 2026]			

HT: AI inside Immersion

PART I — FORESIGHT SNAPSHOT | HT: AI Inside Immersion | Fixed Time-Stamped Synthesis

2026 HT: AI Inside Immersion

Card Type	Historical Technology Shift
Series	Immersive Futures Guild — Vision 2035
Layer	1 — Atomic Foresight Object
Status	Active
Confidence	Medium
Workshop	Circle of Scholars — January 2026
Facilitator	Circle of Scholars Workshop Team
Tags	AI-in-XR | historical | adaptive | layer1 | ht
Tally.so Form	https://tally.so/r/ilrn-if-ht-aiimm-2026

The integration of AI capabilities — adaptive engines, natural language interaction, computer vision — directly into XR environments marks a qualitative shift from XR as a presentation medium to XR as an intelligent, responsive environment. Early research on AI-inside-immersion is generating an initial evidence base but the design, governance, and pedagogical implications remain significantly underexplored.

Key Drivers / Contributing Conditions:

- On-device AI processing enabling real-time environmental response
- Platform integration of LLM APIs into XR development toolkits
- Early commercial deployments in training, healthcare, and education sectors

Tensions Carried Forward to Part II:

- How should design principles for traditional XR learning be updated for AI-responsive immersive environments?

Linked Scenarios / Strands: FT: Agentic AI | STRAND: Human-Centered AI + XR

Ways of Knowing: Tree · Garden · Lantern

PART II — COMMUNITY EVIDENCE & DIALOGUE TRACK | HT: AI Inside Immersion | H2 2026 — Living

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Tensions Open for Community Response:

- How should design principles for traditional XR learning be updated for AI-responsive immersive environments?

Contributor / Date	Category	Way of Knowing	Contribution Summary
[Awaiting contributions — form opens July 1, 2026]			

HT: Natural Embodied Interaction

PART I — FORESIGHT SNAPSHOT | HT: Natural Embodied Interaction | Fixed Time-Stamped Synthesis

2026 HT: Natural Embodied Interaction

Card Type	Historical Technology Shift
Series	Immersive Futures Guild — Vision 2035
Layer	1 — Atomic Foresight Object
Status	Active
Confidence	Medium
Workshop	Circle of Scholars — January 2026
Facilitator	Circle of Scholars Workshop Team
Tags	embodied-interaction | historical | accessibility | layer1 | ht
Tally.so Form	https://tally.so/r/ilrn-if-ht-embodied-2026

The maturation of hand-tracking, body-tracking, gesture recognition, and voice interaction as standard input modalities for XR has removed the requirement for hand-held controllers in many applications. This shift toward natural embodied interaction has significant implications for learning design, accessibility, and the plausibility of embodied cognition claims in immersive environments.

Key Drivers / Contributing Conditions:

- Computer vision advances enabling controller-free tracking
- Meta Quest, Apple Vision Pro, and competitor hardware normalization
- Developer community adoption of hand and body tracking APIs

Tensions Carried Forward to Part II:

- Does natural embodied interaction genuinely engage embodied cognition mechanisms or merely feel more natural?

Linked Scenarios / Strands: STRAND: Embodied Cognition & Learning

Ways of Knowing: Tree · Garden · Lantern

PART II — COMMUNITY EVIDENCE & DIALOGUE TRACK | HT: Natural Embodied Interaction | H2 2026 — Living

T	COMMUNITY CONTRIBUTION FORM — HT: Natural Embodied Interaction Submit case examples, methodological challenges, cultural perspectives, and proposed evidence criteria via: https://tally.so/r/ilrn-if-ht-embodied-2026

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Ways of Knowing accepted: Tree (evidence) | Garden (practice) | Lantern (futures)

Tensions Open for Community Response:

- Does natural embodied interaction genuinely engage embodied cognition mechanisms or merely feel more natural?

Contributor / Date	Category	Way of Knowing	Contribution Summary
[Awaiting contributions — form opens July 1, 2026]			

HT: Spatial Platforms replace Flat Systems

PART I — FORESIGHT SNAPSHOT | HT: Spatial Platforms Replace Flat Systems | Fixed Time-Stamped Synthesis

2026 HT: Spatial Platforms Replace Flat Systems

Card Type	Historical Technology Shift
Series	Immersive Futures Guild — Vision 2035
Layer	1 — Atomic Foresight Object
Status	Active
Confidence	Medium
Workshop	Circle of Scholars — January 2026
Facilitator	Circle of Scholars Workshop Team
Tags	spatial-platforms | historical | virtual-campus | layer1 | ht
Tally.so Form	https://tally.so/r/ilrn-if-ht-spatplat-2026

The emergence of persistent 3D social platforms for conferencing, collaboration, and learning as viable alternatives to 2D video conferencing represents a structural shift in the remote education technology landscape. Platform quality and adoption have been uneven, but the category is established and continues to mature. iLRN's virtual campus work in FrameVR represents a practitioner engagement with this transition.

Key Drivers / Contributing Conditions:

- COVID-19 accelerating remote education technology adoption
- FrameVR, Gather, Horizon Workrooms, and Mozilla Hubs category development
- iLRN and peer organizations deploying 3D virtual conference and campus environments

Tensions Carried Forward to Part II:

- When does the overhead of a spatial platform justify its use over simpler 2D alternatives?

Linked Scenarios / Strands: SCENARIO: Pragmatic Normalization

Ways of Knowing: Tree · Garden · Lantern

PART II — COMMUNITY EVIDENCE & DIALOGUE TRACK | HT: Spatial Platforms Replace Flat Systems | H2 2026 — Living

T	COMMUNITY CONTRIBUTION FORM — HT: Spatial Platforms Replace Flat Systems Submit case examples, methodological challenges, cultural perspectives, and proposed evidence criteria via: https://tally.so/r/ilrn-if-ht-spatplat-2026

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Ways of Knowing accepted: Tree (evidence) | Garden (practice) | Lantern (futures)

Tensions Open for Community Response:

- When does the overhead of a spatial platform justify its use over simpler 2D alternatives?

Contributor / Date	Category	Way of Knowing	Contribution Summary
[Awaiting contributions — form opens July 1, 2026]			

HT: Multimodal Learning Analytics

PART I — FORESIGHT SNAPSHOT | HT: Multimodal Learning Analytics | Fixed Time-Stamped Synthesis

2026 HT: Multimodal Learning Analytics

Card Type	Historical Technology Shift
Series	Immersive Futures Guild — Vision 2035
Layer	1 — Atomic Foresight Object
Status	Active
Confidence	Medium
Workshop	Circle of Scholars — January 2026
Facilitator	Circle of Scholars Workshop Team
Tags	learning-analytics | historical | multimodal | layer1 | ht
Tally.so Form	https://tally.so/r/ilrn-if-ht-mmanalytics-2026

The availability of learning analytics systems capable of processing multiple simultaneous data streams — gaze, gesture, physiological, verbal, and spatial — has expanded the research toolkit for immersive learning researchers. The interpretive frameworks and ethical protocols required to use these tools responsibly are still in active development and remain contested.

Key Drivers / Contributing Conditions:

- XR hardware sensor array maturation
- Research community investment in multimodal analytics methodology
- Commercial analytics platform integration into educational XR

Tensions Carried Forward to Part II:

- What is the minimum ethical standard for deploying multimodal analytics in educational contexts?

Linked Scenarios / Strands: STRAND: Ethical Multimodal Analytics

Ways of Knowing: Tree · Garden · Lantern

PART II — COMMUNITY EVIDENCE & DIALOGUE TRACK | HT: Multimodal Learning Analytics | H2 2026 — Living

T	COMMUNITY CONTRIBUTION FORM — HT: Multimodal Learning Analytics Submit case examples, methodological challenges, cultural perspectives, and proposed evidence criteria via: https://tally.so/r/ilrn-if-ht-mmanalytics-2026

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Ways of Knowing accepted: Tree (evidence) | Garden (practice) | Lantern (futures)

Tensions Open for Community Response:

- What is the minimum ethical standard for deploying multimodal analytics in educational contexts?

Contributor / Date	Category	Way of Knowing	Contribution Summary
[Awaiting contributions — form opens July 1, 2026]			

HT: Mobile Fidelity at Scale

PART I — FORESIGHT SNAPSHOT | HT: Mobile Fidelity at Scale | Fixed Time-Stamped Synthesis

2026 HT: Mobile Fidelity at Scale

Card Type	Historical Technology Shift
Series	Immersive Futures Guild — Vision 2035
Layer	1 — Atomic Foresight Object
Status	Active
Confidence	Medium
Workshop	Circle of Scholars — January 2026
Facilitator	Circle of Scholars Workshop Team
Tags	mobile-XR | historical | accessibility | layer1 | ht
Tally.so Form	https://tally.so/r/ilrn-if-ht-mobilefid-2026

Mobile devices have achieved sufficient processing, display quality, and sensor capability to support mid-fidelity augmented and mixed reality experiences at scale. This has extended the reach of immersive learning beyond dedicated hardware to devices that many learners already own, though with significant implications for the depth and type of immersive experience achievable.

Key Drivers / Contributing Conditions:

- Smartphone GPU capability scaling
- ARKit, ARCore, and WebAR accessibility
- Mobile 5G and WiFi-6 connectivity improving streaming quality

Tensions Carried Forward to Part II:

- Does mobile-accessible XR represent a meaningful equity advance or a qualitatively different experience that should not be counted as equivalent?

Linked Scenarios / Strands: SC: Equity | SCENARIO: Pragmatic Normalization

Ways of Knowing: Tree · Garden · Lantern

PART II — COMMUNITY EVIDENCE & DIALOGUE TRACK	HT: Mobile Fidelity at Scale	H2 2026 — Living

T	COMMUNITY CONTRIBUTION FORM — HT: Mobile Fidelity at Scale Submit case examples, methodological challenges, cultural perspectives, and proposed evidence criteria via: https://tally.so/r/ilrn-if-ht-mobilefid-2026

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Ways of Knowing accepted: Tree (evidence)	Garden (practice)	Lantern (futures)

Tensions Open for Community Response:

- Does mobile-accessible XR represent a meaningful equity advance or a qualitatively different experience that should not be counted as equivalent?

Contributor / Date	Category	Way of Knowing	Contribution Summary
[Awaiting contributions — form opens July 1, 2026]			

HT: Post-hype Reality Check

PART I — FORESIGHT SNAPSHOT | HT: Post-Hype Reality Check | Fixed Time-Stamped Synthesis

2026 HT: Post-Hype Reality Check

Card Type	Historical Technology Shift
Series	Immersive Futures Guild — Vision 2035
Layer	1 — Atomic Foresight Object
Status	Active
Confidence	Medium
Workshop	Circle of Scholars — January 2026
Facilitator	Circle of Scholars Workshop Team
Tags	hype-cycle | historical | evidence | layer1 | ht
Tally.so Form	https://tally.so/r/ilrn-if-ht-posthype-2026

Following the VR hype cycle peak of the mid-2010s, the field underwent a period of consolidation, critical reflection, and evidence-based reassessment. Claims are now held to higher evidential standards, and the burden of proof for immersive learning effectiveness has increased. This historical shift is important for calibrating current technology promises against the field's documented capacity for self-correction.

Key Drivers / Contributing Conditions:

- Enterprise and consumer VR adoption falling below 2015-era projections
- Learning scientists applying more rigorous evaluation standards to XR claims
- Publication of critical reviews and null-result studies gaining visibility

Tensions Carried Forward to Part II:

- Has the post-hype correction been sufficient, or does the field still systematically overstate immersive learning effects?

Linked Scenarios / Strands: SC: Research Integrity Under Pressure

Ways of Knowing: Tree · Garden · Lantern

PART II — COMMUNITY EVIDENCE & DIALOGUE TRACK | HT: Post-Hype Reality Check | H2 2026 — Living

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- Has the post-hype correction been sufficient, or does the field still systematically overstate immersive learning effects?

Contributor / Date	Category	Way of Knowing	Contribution Summary
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HT: Affordable XR goes Mainstream

2026 HT: Affordable XR Goes Mainstream

Card Type	Historical Technology Shift
Series	Immersive Futures Guild — Vision 2035
Layer	1 — Atomic Foresight Object
Status	Active
Confidence	Medium
Workshop	Circle of Scholars — January 2026
Facilitator	Circle of Scholars Workshop Team
Tags	affordable-XR | historical | equity | layer1 | ht
Tally.so Form	https://tally.so/r/ilrn-if-ht-affordxr-2026

The release of standalone headsets at consumer price points — most significantly Meta Quest devices — constituted a meaningful threshold crossing for XR accessibility. While significant affordability barriers remain in low-income and Global South contexts, the price-performance trajectory of standalone XR hardware has shifted the equity conversation from 'whether' affordable XR is achievable to 'when and for whom' it is achievable.

Key Drivers / Contributing Conditions:

- Meta Quest 2/3 price point and standalone capability
- Competitive market pressure reducing headset costs
- Educational bulk-purchasing programs expanding institutional access

Tensions Carried Forward to Part II:

- Does affordable XR in wealthy country markets constitute progress on global equity, or does it primarily widen the gap?

Linked Scenarios / Strands: SC: Equity | SC: Global Inequality

Ways of Knowing: Tree · Garden · Lantern

PART II — COMMUNITY EVIDENCE & DIALOGUE TRACK | HT: Affordable XR Goes Mainstream | H2 2026 — Living

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Contributor / Date	Category	Way of Knowing	Contribution Summary
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