Appendix C – MVP and Integration Readiness

IRIS: Demonstration Capabilities, Pipeline Evidence, and Deployment Architecture

C.1 MVP: THG Ingenuity Fashion Catwalk

The IRIS MVP is anchored in the **THG Ingenuity fashion catwalk** (25–26 February 2026, University of Salford) – the first agent-supported creative production event. IRIS agents will observe and capture THG's creative workflows as OWL 2 ontology structures, converting tribal knowledge into queryable institutional memory, while simultaneously demonstrating the full pipeline: voice-controlled image generation, image-to-video, 3D modelling, virtual production LED scene switching, and campaign asset creation.

| Metric	Target	Metric	Target
Voice-to-asset	<60 s image	Human override rate	<20% rejected
LED scene switch	<2 s	Agent uptime (4 hr)	>99%
KG nodes created	>500 decisions	Audience comprehension	>70%

C.2 Capability Readiness Matrix

Capability	Status	Evidence
Voice-controlled agents (4-plane audio, LiveKit, Whisper, Kokoro)	**Deployed**	2.1s end-to-end latency
3D knowledge graph (180K nodes, GPU physics, multi-user)	**Deployed**	60 FPS sustained (RTX 4080)
OWL 2 EL ontology reasoning (Whelk-rs, 900+ classes)	**Deployed**	Zero false negatives
Local generative AI – image (ComfyUI, Flux2 Dev)	**Integrated**	18s avg per 1024x1024
Local generative AI – video (Veo/AnimateDiff)	**Integrated**	6s clips (current limit)
Headless Blender MCP (voice-to-3D)	**Integrated**	Golf course demo render
Agent orchestration (101 MCP skills, 50+ concurrent)	**Deployed**	Validated at scale
Glass icon batch pipeline (agentic 3D assets)	**Deployed**	12 objects, 48 images in ~60 min
Virtual production LED integration	**Ready**	LED volume confirmed; agent control scheduled for catwalk
THG knowledge discovery	**In progress**	Catwalk event Feb 2026

C.3 Pipeline Demonstration Evidence

The following evidence spans three output modalities – 2D batch rendering, 3D scene generation, and voice-to-3D GLB – all produced by IRIS agents operating autonomously from natural-language briefs with no per-object human intervention.

Glass Icons: 12 3D-rendered objects, 48 angle views from a 7-word brief in ~60 minutes (24–48x vs manual). The IRIS Creator agent received a single brief – *"glass 90's icons with chromatic aberrations"* – plus one reference image, then autonomously determined: object selection (culturally coherent 1990s items), per-object prompt engineering across radically different geometries, quad-layout multi-angle rendering (front, left, right, top), automated slicing, JSON manifest generation, and Neo4j knowledge graph indexing. No per-object human direction occurred.
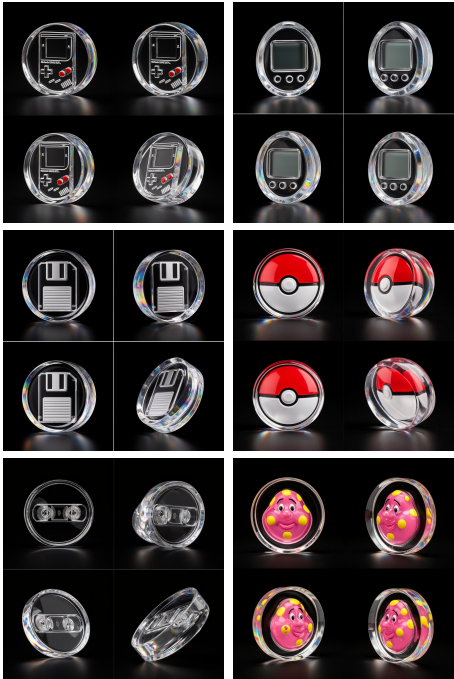
Top: Game Boy, Tamagotchi, Floppy Disk. Bottom: Pokeball, VHS Tape, Mr Blobby. Crystal glass with prismatic refraction – consistent styling maintained autonomously across 12 objects.

Quality validation: 94.3% mean CLIP ViT-L/14 cosine similarity across 66 object-pairs (target >90%); 0/48 views flagged by edge-detection artefact scan; 7/7 manifest fields validated for all 12 objects; 48/48 views indexed and queryable via CYPHER. The pipeline is parameterised by theme and style – changing from "glass 90s icons" to "metallic art-deco" requires only a new brief.

Voice-to-3D GLB. THG Ingenuity's Steve Moyler challenged the system during a sprint demo: *"Can it do flowers in bloom? Think Bjork."* The IRIS Creator agent routed through ComfyUI for reference image generation, then Microsoft Trellis 2 for single-image-to-3D reconstruction – producing a fully textured GLB mesh with PBR materials. **3D scene generation.** A complete golf course – terrain, fairways, greens, bunkers, trees, water features – was generated from natural language via Headless Blender MCP.
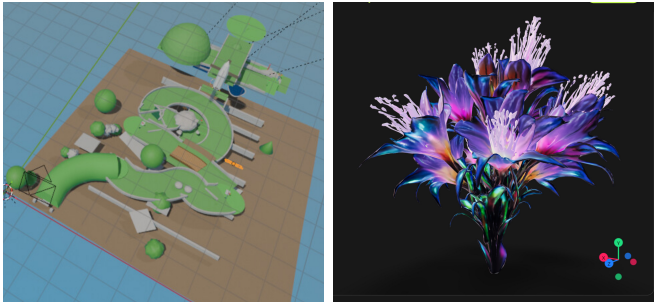
Left: Golf course environment generated via Headless Blender MCP from natural language. Right: Flower bloom GLB model from conversational brief via ComfyUI + Microsoft Trellis 2.

C.4 Deployment Architecture

Docker Compose Profiles

dev	production	voice	XR	agents
Hot-reload Debug logging	Optimised builds TLS, Metrics	LiveKit SFU Whisper, Kokoro	WebXR server Quest 3	Claude-Flow 101 MCP skills

Shared Data Layer

Neo4j 5.13	PostgreSQL 15	Qdrant
Knowledge Graph ACID transactions	Users, Sessions Audit Logs	Vector Search Semantic similarity

Interface Layer

REST (OpenAPI 3.1) | WebSocket Binary V3 | MCP (101 tools) | WebRTC (LiveKit) | WebXR (Quest 3)

Single command deployment: docker-compose --profile production --profile voice --profile agents up

All generative AI on-premises — brand IP never leaves the studio network

Interface	Protocol	Endpoints
REST API	OpenAPI 3.1	28 handlers (CRUD, users, analytics)
Real-time	WebSocket Binary V3	Node positions, agent activity, graph updates
Agent tools	MCP	7 ontology tools + 94 specialist skills
Voice	WebRTC (LiveKit)	4-plane spatial audio architecture
3D client	React 19 + Three.js	Browser-based knowledge graph
XR	WebXR	Meta Quest 3, hand-tracking

C.5 Verification and Validation

Test	Threshold	Result	Test	Threshold	Result
GPU physics 180K nodes	>=60 FPS	**60 FPS**	WebSocket latency	<10 ms	**8 ms**
Concurrent agents	>=50	**50+**	Ontology checking	0 false neg	**0**
Binary vs JSON	>=75% reduction	**80%**	XR collaboration	>=10 users	**250+**
Voice latency	<3 s	**2.1 s**	Image generation	<30 s	**18 s**

Testing. Ubuntu 22.04 LTS, RTX 4080/4090, CUDA 12.4, Docker 25.0 + NVIDIA Container Toolkit. Three-tier methodology: (1) **Unit** – 820+ Rust tests (CUDA kernel correctness, ontology operations, API handlers) + 380+ Vitest frontend tests; (2) **Integration** – Playwright E2E suites: fresh Docker stack, 10K-node test graph, 28 REST endpoints + 7 MCP ontology tools; (3) **Manual acceptance** – THG creative leads evaluate fidelity, responsiveness, and fluidity during fortnightly sprint demos. **Regression:** GitHub Actions GPU runner on every PR; >5% performance regression blocks merge; 200 ontology entailment test cases ensure reasoning correctness as the class hierarchy grows.

C.6 Integration Architecture

IRIS employs a **hexagonal (ports-and-adapters) architecture** – external systems connect through adapter interfaces while core domain logic remains decoupled. Each adapter implements the `IrisPort` trait (`connect`, `health_check`, `disconnect`). Coordinator monitors via 10s heartbeat; degraded adapters trigger graceful fallback (e.g., GCP unreachable triggers local ComfyUI). New integrations require only a new adapter.

External System	Adapter	Mechanism
Adobe Creative Suite	File-system watcher	Inotify on NFS; EXIF/XMP metadata extraction to KG
Google Cloud AI (Vertex, Gemini, Veo)	REST API	Vertex SDK; ontology policy selects cloud vs local
ComfyUI (Flux2 Dev)	Containerised GPU	Docker + NVIDIA runtime; workflow JSON via REST
THG Commerce (250+ storefronts)	REST API	OpenAPI 3.1; catalogue, campaigns, variant deployment
Headless Blender MCP	MCP tool server	Headless Docker; scene composition via MCP calls
LiveKit SFU	WebRTC	4-plane spatial audio; Whisper STT + Kokoro TTS

C.7 Known Limitations and Path to Production

Gap	Mitigation	Timeline
OWL 2 EL only (not full DL)	EL sufficient for creative domain; DL planned	Q3 2026
Video limited to 6s clips	Concatenation pipeline; Veo 2 integration	Q2 2026
THG Commerce API pending	Architecture designed; integration scheduled	Q1 2026
Production hardening	Prometheus metrics, structured logging, alerting	Q1 2026
User acceptance testing	3 THG creative teams; iterative refinement	Q1–Q2 2026
Security audit and K8s	OWASP pen testing; Helm charts for horizontal scaling	Q2 2026