LIVE WINDOW

An Interactive Display for the HKU Arts Technology Lab

Academic Project Evaluation and Research Delivery Report

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Project status: Advanced functional prototype with incomplete empirical validation

This report evaluates the project against the original guide, the team brainstorming record, the current ATL website, and the completed HTML prototype.

Abstract

This report evaluates Live Window, an interactive touchscreen interface developed for the entrance of the University of Hong Kong Arts Technology Lab. The project addresses limitations in the current public website, including dense content, inconsistent hierarchy, repetitive or time-sensitive information, and the mixing of visitor-facing content with administrative resources. The team developed a large single-file HTML prototype using ChatGPT Plus as the principal AI-assisted coding environment. ChatGPT Plus and DeepSeek supported conceptual development, while TapNow, Seedance 2.0, and Gemini contributed to the AI video workflow and CapCut was used for editing. The resulting prototype includes an animated opening sequence, project and event browsing, About ATL content, resources, team profiles, bilingual display options, accessibility-related settings, an inactivity reset, a promotional video, and a local password-gated content editor. Attempts to create a realistic interactive 3D representation were less successful. SketchUp Free imposed a high learning cost, Polycam scanning was constrained by mobile hardware and produced insufficient fidelity, and Blender-based reconstruction did not adequately reproduce the physical ATL environment. The report concludes that the visible artefact is an advanced functional prototype, but the research project is not complete because the proposed comparative usability experiment has not yet generated valid evidence. An equal-weight maturity assessment estimates approximately 60 per cent completion against the original full brief. The principal contribution at this stage is therefore a research-through-design prototype, a documented AI-assisted workflow, a curated content architecture, and a set of design lessons, rather than a proven improvement in information retrieval. A strengthened mixed-method evaluation, production hardening plan, and revised 2.5D spatial strategy are proposed.

Keywords: interactive public display, touchscreen interface, information architecture, research through design, AI-assisted coding, AI-generated video, usability evaluation, 3D capture, digital humanities, arts technology

Executive Evaluation

> ### Overall judgement
> The project should be presented as an advanced functional prototype and design research outcome. It should not yet be presented as evidence that the touchscreen improves retrieval efficiency, because the planned comparative experiment and statistical analysis remain incomplete.

Dimension	Evaluation	Evidence-based interpretation
Problem investigation	Strong	The team identified information overload, inconsistent presentation, repetition, outdated content, and weak public discovery pathways in the original website.
Concept and information architecture	Strong	The touchscreen was reframed as a curated public discovery layer rather than a duplicate of the full institutional website.
Functional prototype	Advanced	The HTML artefact implements substantial navigation, content, visual motion, settings, media, and local editing functions.
AI video	Advanced	A 57-second promotional film provides an original narrative and engagement layer that was not central to the initial brief.
3D spatial experience	Incomplete	SketchUp Free, Polycam, and Blender trials did not produce a sufficiently accurate and usable representation of ATL.
Search and AI guide	Not implemented	These remained conceptual features and should not be included in claims about the current prototype.
Production readiness	Partial	The monolithic file, remote assets, client-side editor, and static password create maintenance, offline, and security risks.

Dimension	Evaluation	Evidence-based interpretation
Empirical research validation	Incomplete	No defensible comparison of task success, retrieval time, interaction steps, usability, or satisfaction can yet be reported.

The project has achieved more than a visual mock-up. It is a working interactive artefact with a substantial content base and several thoughtful kiosk-oriented behaviours. Its central weakness is not lack of effort or creativity, but a mismatch between the breadth of the original ambition and the evidence currently available. The research delivery will be strongest when it distinguishes completed implementation, provisional design findings, failed experiments, and untested future features.

Contents

1. Introduction and Project Context

1.1 Institutional context

The Arts Technology Lab, commonly referred to as ATL, is a public-facing facility within the Faculty of Arts at the University of Hong Kong. Its role is to support interdisciplinary research, teaching, experimentation, and public engagement at the intersection of arts, humanities, and technology. The current ATL website includes information about the Lab, research projects, events, spaces, resources, staff, opportunities, and administrative functions. The Live Window project seeks to transform the entrance screen into a more focused and interactive discovery interface for visitors.

The distinction between the current website and the proposed touchscreen is fundamental. The website can continue to function as the detailed institutional source, while the touchscreen should operate as a concise public discovery layer. It should help a visitor understand what ATL is, what it has achieved, what facilities and technologies it provides, what projects it supports, and how a person can participate.

1.2 Original project brief

The original guide proposed an interactive display that could automatically present videos and project highlights while allowing visitors to browse ATL information and explore a 3D floor map. It also required a mixed-method evaluation comparing the official website and the new Live Window through retrieval tasks, time-on-task measures, interaction-step counts, and post-test qualitative feedback. The guide recommended AI-assisted coding, a single HTML frontend, local computer testing, and kiosk deployment.

The guide therefore contains two inseparable deliverables. The first is the technical artefact. The second is research evidence demonstrating whether the artefact improves information retrieval and discovery. A complete evaluation must assess both.

1.3 Scope of this report

This report evaluates the project using four forms of evidence: the original guide, the brainstorming and design record, the current ATL website as audited on 31 July 2026, and the submitted HTML prototype. It also incorporates the team's account of its actual AI toolchain, video production workflow, and unsuccessful 3D modelling experiments.

- The report evaluates what has been completed and what remains conceptual or untested.
- It interprets failed 3D experiments as valid research evidence rather than simply missing output.
- It identifies methodological weaknesses that would prevent strong causal claims.
- It proposes a research-ready evaluation protocol and a production roadmap.
- It provides appendices that can be used directly for testing, reporting, and process documentation.

2. Problem Investigation and Design Rationale

2.1 Problems identified in the original website

The brainstorming record correctly identified that the principal challenge was not the absence of content. The challenge was the organisation, selection, and presentation of a large amount of content to short-stay public visitors. The current website serves many audiences and therefore combines institutional introduction, projects, events, facilities, resources, staff information, opportunities, funding, booking, policies, and internal functions.

Observed problem	Research significance	Design response

Observed problem	Research significance	Design response
Information overload	Visitors may not identify the most important ATL content within a short encounter.	Use no more than five or six primary choices and progressively disclose detail.
Weak hierarchy	Institutional identity, achievements, facilities, and participation routes compete with lower-priority content.	Prioritise About ATL, projects, spaces, achievements, and opportunities.
Inconsistent presentation	Different page structures and content lengths increase cognitive effort and reduce visual coherence.	Apply common cards, typography, media ratios, tags, and concise summaries.
Repetition	Repeated project, facility, booking, and resource information complicates updating and can create contradictions.	Create one canonical content record for each item.
Time-sensitive and archived content	Visitors can encounter past events or expired information without a clear distinction.	Separate upcoming, archived, and hidden items through explicit status rules.
Public and administrative content mixed together	Visitors encounter staff or student processes that do not support public discovery.	Retain administrative content on the main website and link to it through QR codes when necessary.
Limited expression of arts and technology intersection	A conventional menu does not communicate ATL's interdisciplinary identity strongly.	Use thematic categories, media, and spatial storytelling to connect arts disciplines with technologies.

2.2 Target users and context of use

The likely users include HKU students, academic and research staff, professional staff, prospective students, visitors, project collaborators, and event participants. These groups differ in prior familiarity with ATL, technical literacy, language preference, physical reach, and time available. The entrance display must therefore support both ten-second orientation and deeper exploration.

- Passers-by need an attract state that communicates interactivity without instruction-heavy text.
- First-time visitors need clear categories and visible navigation controls.
- Returning users may seek a specific project, space, contact route, or opportunity.
- Public touchscreen users require large touch targets, immediate feedback, recovery options, and automatic session reset.
- The interface should not expose personal searches or prior user sessions after inactivity.

2.3 Core design rationale

The brainstorming process developed a strong design principle: the touchscreen should be curated rather than comprehensive. This principle directly addresses the problems of information overload and inconsistent hierarchy. The planned 3D map was intended to serve both as a spatial representation of ATL and as a visual menu. Although the final 3D implementation was not successful, the underlying goal remains valuable. Visitors should be able to understand the relationship between ATL's physical spaces, facilities, technologies, projects, and public activities.

> **Key design proposition**
>
> The full website is the detailed institutional platform. The Live Window is the public discovery interface. Any content that does not help visitors understand ATL, its work, its facilities, its impact, or participation routes should be removed from the primary touchscreen journey or moved behind a QR code.

3. Research Aims, Questions, and Success Criteria

3.1 Research aim

The research aims to determine how a curated interactive touchscreen can improve the efficiency, clarity, and engagement of public discovery of ATL when compared with the current website, while examining the practical opportunities and constraints of AI-assisted prototyping, AI video production, and low-cost 3D representation.

3.2 Refined research questions

Code	Research question
RQ1	To what extent does the Live Window improve task success, retrieval time, and the number of interaction steps required to locate key ATL information compared with the official website?
RQ2	How do users evaluate the clarity, usability, visual consistency, engagement, and perceived usefulness of the Live Window?
RQ3	Which information architecture, interaction, media, and kiosk design features most effectively support discovery in a public entrance context?
RQ4	How does an AI-assisted workflow using ChatGPT Plus and other generative tools support rapid design and development, and what verification, maintainability, and authorship risks emerge?
RQ5	What technical and methodological constraints affect low-cost 3D capture and reconstruction of an indoor laboratory environment?

3.3 Operational success criteria

Outcome area	Suggested measure	Minimum evidence required
Efficiency	Median task completion time and tap count	Comparable tasks completed on both interfaces using a counterbalanced design.
Effectiveness	Task completion rate, errors, abandonment, and requests for help	Predefined task success criteria and consistent observation rules.
Usability	System Usability Scale score and observed interaction problems	Completed post-use questionnaire and facilitator notes.
User experience	UEQ-S pragmatic and hedonic quality scores	Validated scale administered after each interface or at the end of the comparison.
Discoverability	First action, time to first meaningful interaction, and content found without assistance	Observation from realistic entrance use or controlled walk-up tasks.
Accessibility	Keyboard, focus, contrast, target size, captions, alt text, and reduced motion checks	Documented accessibility audit and physical touchscreen testing.
Maintainability	Time and steps needed to update a content item	Administrator task test using a secure content workflow.

4. Literature Review

4.1 Interactive public displays and the transition from attention to engagement

Müller et al. (2010) describe public-display interaction as a sequence in which a screen must first attract attention, communicate that it is interactive, motivate an initial action, and support continued engagement. This is directly relevant to the Live Window because a public entrance display cannot assume that visitors intend to use it. The animated opening state, strong ATL identity, movement, and touch prompt therefore serve an interaction function rather than merely a decorative one.

Parra, Klerkx, and Duval (2014) similarly show that noticing a public display does not guarantee sustained interaction. Engagement develops through distinct phases, and visual feedback must be combined with meaningful content and clear interaction possibilities. For the Live Window, this implies that animation should lead quickly to understandable choices, not delay access or create uncertainty about what can be touched.

4.2 Information architecture and progressive disclosure

The central design problem is one of information architecture. A public kiosk should not reproduce every page of a complex website. The brainstorming proposal to separate attract, explain, and explore-further levels is consistent with progressive disclosure. A title, image, and short label attract attention. A one-sentence summary and media item explain the topic. Optional project-team details, related links, and QR codes support deeper inquiry. This structure reduces cognitive load while preserving access to detailed information.

The current prototype partially applies this principle through category-based browsing and concise cards. However, the inclusion of dozens of projects and events means that curation remains an ongoing requirement. A touchscreen can become overloaded even when its individual cards are visually consistent.

4.3 3D maps as spatial interfaces

Judge and Harrie (2020) argue that 3D visualisation can improve understanding when navigation, visual hierarchy, uncertainty, and information density are carefully managed. Their work also warns against assuming that three-dimensional representation is inherently clearer. A 3D map can introduce visual clutter, occlusion, disorientation, and interaction cost. For ATL, the research question should not be whether a 3D map is technically impressive, but whether it helps visitors understand spaces and reach information more efficiently than a simpler alternative.

The unsuccessful SketchUp, Polycam, and Blender experiments reinforce this point. They suggest that a high-fidelity 3D reconstruction may not be proportionate to the project's time, hardware, and skills. A labelled 2.5D floor plan with photographs, room hotspots, and simple zoom transitions may provide greater usability, accuracy, and maintainability.

4.4 Usability, accessibility, and public touchscreen design

Usability should be evaluated in relation to specified users, goals, tasks, and context of use, following the logic of ISO 9241-11. Public touchscreen design also requires attention to target size, focus visibility, alternatives to gesture-only interaction, readable contrast, captions, session privacy, and error recovery. WCAG 2.2 adds a minimum target-size success criterion and continues to recommend accessible alternatives for non-text content and multimedia. The prototype includes several positive measures, including large controls, reduced-motion support, brightness settings, and an inactivity reset. It does not yet demonstrate full conformance because some images lack alternative text, the embedded video lacks a caption track, and touchscreen reach and contrast have not been audited on the installed display.

4.5 Research through design and mixed-method evaluation

Research through Design treats the designed artefact and the knowledge generated through making as research contributions. Zimmerman, Forlizzi, and Evenson (2007) emphasise that design research can generate transferable knowledge through iterative framing, artefact creation, and reflection. This approach is appropriate for Live Window because the project produced not only an interface but also evidence about content curation, AI-assisted development, public-display interaction, and the feasibility of different 3D workflows.

Research through Design does not remove the need for evaluation. The guide's combination of performance measures and qualitative feedback is appropriate, but the design requires strengthening. Quantitative measures can establish whether users complete tasks more quickly and accurately, while interviews can explain why particular interface features help or hinder them. Braun and Clarke's (2006) thematic analysis provides a systematic approach to coding interview data and developing themes.

4.6 AI-assisted coding and human verification

Studies of code-generating assistants show that users move between acceleration and exploration. In acceleration mode, AI helps implement a known solution more quickly. In exploration mode, AI proposes possibilities when the user is uncertain. Barke, James, and Polikarpova (2023) describe this dual pattern, while Vaithilingam, Zhang, and Glassman (2022) identify usability challenges in understanding, verifying, and debugging generated code. These findings closely match the Live Window process, where AI accelerated layout, interaction, and debugging but also produced a very large monolithic file that requires careful human review.

The academically defensible position is therefore not that AI built the system autonomously. The project team framed the problem, selected content, judged outputs, revised prompts, integrated assets, tested interactions, and accepted or rejected generated code. The report should document these human decisions and avoid treating generated output as verified by default.

4.7 Mobile 3D capture and fidelity constraints

Paukkonen (2023) demonstrates that mobile LiDAR and video photogrammetry can support field documentation, but their value depends on sensor capability, capture conditions, workflow control, post-processing, and the intended accuracy. Consumer-device capture is not a guaranteed route to a clean, complete indoor model. Reflective surfaces, repetitive walls, poor lighting, narrow spaces, camera movement, and insufficient sensor quality can produce incomplete geometry and distorted textures. These issues are consistent with the team's Polycam experience and explain why the scans did not reliably represent ATL.

4.8 Evaluation instruments

The System Usability Scale provides a short global measure of perceived usability, while the eight-item UEQ-S distinguishes pragmatic quality from hedonic quality. This distinction is useful because the Live Window is intended both to help visitors retrieve information and to create an attractive, engaging introduction to ATL. Performance metrics, SUS, UEQ-S, and thematic analysis should be interpreted together rather than reduced to a single satisfaction score.

5. Methodology and Actual Development Process

5.1 Research design

The most accurate methodological description is an iterative Research through Design project with a planned mixed-method comparative usability study. The development process generated a functional artefact and design knowledge. The evaluation phase should combine quantitative task performance with qualitative explanation.

5.2 Evidence and project materials

Evidence source	Role in the study

Evidence source	Role in the study
Original guide	Defines the initial aim, planned features, suggested tools, development phases, and comparative user-testing requirements.
Brainstorming document	Records the diagnosis of the existing website, content strategy, desired features, survey ideas, 3D concept, and AI video concept development.
Current ATL website	Provides the baseline information architecture and source content for projects, events, facilities, resources, and people.
Completed HTML prototype	Provides direct evidence of implemented functions, content, code architecture, media, accessibility provisions, and technical limitations.
Team process account	Clarifies the actual AI toolchain and documents the failed SketchUp, Polycam, and Blender workflows.

5.3 Stage 1: website audit and problem framing

The team reviewed the existing ATL website to identify visitor-relevant content and structural weaknesses. The process distinguished content that should be retained, shortened, linked, archived, or excluded from the main touchscreen journey. The resulting problem definition focused on discoverability, consistency, visual engagement, and rapid access to key information.

5.4 Stage 2: ideation and requirements development

The brainstorming stage explored an animated opening, category-based navigation, project and event presentation, a 3D map, video, search, an AI guide, facilities, resources, and team information. The team also developed a fantasy promotional video concept in which a cat protagonist travels through ATL and encounters selected research projects. This video concept was a new creative extension rather than a direct requirement of the original guide.

5.5 Stage 3: AI-assisted interface development

The final touchscreen web interface was developed with ChatGPT Plus. Google AI Studio, although recommended in the guide, was not used. ChatGPT Plus supported iterative prompt-based coding, debugging, interface revision, integration, and feature refinement. The project team supplied content, defined interaction requirements, tested the output, reported errors, and requested targeted changes. This process is better described as AI-assisted iterative development than as fully autonomous generation.

5.6 Stage 4: AI video production

Workflow component	Actual tools and role
Concept development	ChatGPT Plus and DeepSeek supported story development, scene sequencing, visual motifs, and the integration of six ATL projects into a short narrative.
AI generation	TapNow, Seedance 2.0, and Gemini were used during the image and video generation workflow.
Editing	CapCut was used to assemble shots, refine timing, manage transitions, and produce the final promotional video.
Human contribution	The team selected project content, judged visual consistency, revised prompts, rejected unsuitable generations, arranged shots, and controlled the final narrative.

The video should be documented as a separate creative research output because it investigates how narrative, character, motion, and fantasy can attract visitors and communicate the breadth of ATL. It should not be treated as a factual representation of the physical environment unless clearly labelled as a creative interpretation.

5.7 Stage 5: 3D modelling experiments

Attempt	Reason for selection	Observed difficulty	Research interpretation
SketchUp Free	Recommended in the original guide for creating a simple floor model.	The learning cost was too high relative to the project timetable and the team's prior experience.	Tool recommendations must account for onboarding time, not only licensing cost.
Polycam	Offered a faster mobile scanning route with less manual modelling.	Mobile hardware limitations and indoor capture conditions produced low-fidelity geometry and textures.	Low-cost scanning is strongly dependent on sensor quality, capture method, lighting, and space characteristics.
Image-based reference	Could provide realistic material and room cues.	Images did not sufficiently represent the actual ATL environment when transformed or reconstructed.	Photographic realism does not guarantee spatial accuracy or institutional authenticity.
Blender	Could combine and repair different indoor environments and assets.	Manual integration remained difficult and the model did not reach the expected visual or spatial quality.	Post-processing cannot fully compensate for incomplete source geometry, limited time, and a fragmented capture pipeline.

Methodological value of the failed 3D work

The unsuccessful 3D pipeline is a valid negative result. It demonstrates that a high-fidelity scan-and-reconstruction workflow was not feasible under the available hardware, skills, and time. This finding justifies a revised 2.5D floor-plan strategy rather than being hidden as an implementation failure.

5.8 Stage 6: prototype audit

The submitted HTML file was examined structurally to identify implemented functions, content volume, media handling, accessibility provisions, and production risks. The audit did not constitute a full security test or a complete WCAG conformance assessment. It provides evidence about implementation maturity and areas requiring further testing.

5.9 Stage 7: planned empirical evaluation

The guide proposed two different participant groups, each completing the same retrieval tasks on one interface. This design can generate basic comparison data, but differences between the groups may confound the result. A counterbalanced within-participant design is recommended in Section 11 because it controls more effectively for individual differences in web skill, ATL familiarity, reading speed, and search strategy.

5.10 Ethics and data management

- Participants should receive an information sheet and provide voluntary consent.
- No names should be attached to interaction logs or survey responses unless necessary and approved.
- Screen recording should be optional and disclosed in advance.
- The public display should clear searches, editor states, and any future chatbot conversation after inactivity.
- AI-generated media should be labelled and documented through a provenance log.
- Only verified ATL facts should be published, with dates and responsible content owners recorded.

6. Prototype Implementation and Feature Audit

6.1 Technical overview

Audit item	Observed evidence
File architecture	One self-contained HTML file of approximately 34 MB and 21,318 lines.
Interaction controls	Approximately 80 button elements and a large JavaScript interaction layer.
Visual content	64 image elements, one embedded video, animated backgrounds, category cards, and multiple carousel-style interfaces.
Content volume	36 project records and 32 event records were identified in the prototype data.
Primary categories	Projects, Events, About Us, Resources, and Lab Team.
Language support	English and Traditional Chinese display content.
Session behaviour	A 30-second inactivity reset returns the interface towards the opening state.
Local content management	A password-gated editor stores managed content in IndexedDB on the local browser.
3D integration	No Three.js or GLTF loader integration and no working GLB-based map were identified.
Search and chatbot	No user-facing search engine or AI guide is implemented.

6.2 Implemented public-facing features

- An animated opening state that expands the full Arts Technology Lab name and introduces an interactive category arrangement.
- Project browsing with ongoing and completed groupings and image-based records.
- Event browsing across AI teaching, InnoArts, and lecture-series groupings.
- About ATL content including an institutional introduction, Our Lab material, and question-and-answer content.
- Resource and AI-tool sections, computing information, and team and intern profiles.
- A 57-second embedded promotional video with custom playback handling.
- English and Traditional Chinese language options.
- Brightness and night-mode controls.
- Reduced-motion CSS provisions for users who prefer less animation.
- A mini-game and other engagement elements.
- A local editor for opening content, projects, events, resources, AI tools, and people.
- Automatic inactivity reset intended for a shared public-display context.

6.3 Design strengths visible in the prototype

The prototype demonstrates a coherent visual identity, strong motion design, and considerable content integration. The opening transition makes the ATL name memorable while communicating that the screen is interactive. The category structure is more focused than the full website, and the bilingual display improves accessibility for a Hong Kong university context. The inactivity reset, local editor, and reduced-motion provisions show that the team considered operation on a shared touchscreen rather than treating the output as an ordinary desktop page.

6.4 Technical limitations visible in the prototype

Limitation	Impact
Monolithic file architecture	A very large HTML file is difficult to review, test, maintain, version, and hand over to future staff or students.

Limitation	Impact
Embedded and remote media	The file remains dependent on remote ATL image URLs and includes large embedded data, which can create slow loading and unreliable offline behaviour.
Client-side security	A fixed password inside front-end code can be discovered and does not provide secure authorisation.
Local-only content storage	IndexedDB updates remain tied to a particular browser profile and device and are not a shared institutional content-management solution.
No true 3D map	The core spatial-navigation claim from the original brief remains unmet.
No search or AI guide	Users cannot directly retrieve information through the conceptual search and chatbot routes described in brainstorming.
Accessibility gaps	Fifteen image elements were identified without meaningful alternative text, and the video does not include a subtitle track element.
No in-page kiosk enforcement	Browser kiosk mode must be configured at operating-system or browser level and is not guaranteed by the HTML itself.

7. Project Completion Evaluation

7.1 Assessment principle

Completion should not be judged only by whether the webpage opens and responds to touch. The original project includes problem investigation, content selection, design, technical implementation, media, 3D representation, deployment, and empirical evaluation. The following maturity estimate assigns equal weight to twelve work packages. It is an analytical judgement based on available evidence, not a formal project-management percentage recorded by the team.

Work package	Estimated maturity	Status	Basis of assessment
Problem diagnosis	90%	Substantially complete	Clear identification of structural and visitor-experience problems.
Content audit and curation	85%	Advanced	Extensive project, event, resource, and team content has been collected and rewritten.
Information architecture	85%	Advanced	Focused categories and a discovery-layer concept are established.
Touchscreen interface implementation	85%	Advanced	Working navigation, motion, media, settings, and reset behaviour are present.
Content population	80%	Advanced	Large project and event datasets are integrated, though curation and verification remain.
Accessibility and bilingual support	65%	Partial to advanced	Language, reduced motion, and settings exist, but full accessibility testing is incomplete.
AI promotional video	90%	Substantially complete	The embedded film is a polished creative output, although captions and provenance should be strengthened.
3D representation	20%	Exploratory only	Several workflows were attempted, but no satisfactory interactive model was integrated.
Search and AI guide	0%	Not implemented	These features remain conceptual.
Content management and security	55%	Partial	A local editor exists, but it is not a secure or shared institutional system.
Deployment, kiosk, and offline reliability	45%	Partial	The project can run locally, but production configuration and local asset packaging remain incomplete.
User study and analysis	20%	Preparatory only	Survey and task ideas exist, but valid comparative results are not available.

Overall analytical estimate: approximately 60 per cent against the original full brief

The visible product is more mature than the overall research project. The incomplete 3D work, absent search and AI guide, production-hardening gaps, and incomplete user study reduce the total maturity. The correct academic classification is an advanced prototype with incomplete validation.

7.2 Completed deliverables

- A documented problem investigation and content strategy.
- A developed information architecture for a public discovery interface.
- A working single-file touchscreen prototype with substantial ATL content.
- An animated visual identity and clear category-based interaction.
- A bilingual user interface with display settings and inactivity reset.
- An original AI-generated promotional film and associated creative workflow.
- A local content-editing mechanism and structured content records.
- A documented series of 3D modelling and scanning experiments.
- A preliminary survey and evaluation concept.

7.3 Incomplete or deferred deliverables

- A satisfactory interactive 3D map of the real ATL environment.
- A user-facing search engine.
- An ATL AI guide grounded in verified content.
- A secure, shared, server-backed content-management workflow.
- A complete offline package with all media assets stored locally.
- Confirmed kiosk deployment and long-duration stability testing on the target screen.
- A completed accessibility audit and captioned media.
- Comparative usability data and statistical analysis.
- A final evidence-based answer to the original research question.

7.4 What can and cannot currently be claimed

Defensible current claim	Claim that should not yet be made
The prototype reorganises ATL content into a more visually consistent and touchscreen-oriented format.	The new interface has been proven to reduce retrieval time.
The interface includes substantial functional interaction and public-kiosk behaviours.	Users find the new interface easier or more satisfying than the current website.
AI tools supported rapid prototyping, ideation, media generation, and revision.	AI reduced total development time by a measured amount or improved code quality.
The 3D experiments revealed significant feasibility and fidelity constraints.	A 3D map improves spatial understanding in this implementation.
The promotional video provides an original narrative method for presenting ATL projects.	The video increases engagement or knowledge retention without user evidence.

8. Research Outcomes and Contributions

8.1 Design outcome: a curated discovery-layer model

The strongest conceptual outcome is the distinction between an institutional website and a public discovery interface. This is transferable beyond ATL. Museums, laboratories, libraries, and university centres often maintain content-heavy websites that serve administrative and archival purposes. A public entrance display requires a different hierarchy, interaction rhythm, and content density.

8.2 Artefact outcome: a functional interactive prototype

The HTML prototype is a substantive research artefact rather than a static demonstration. It combines multiple sections, structured data, local editing, visual motion, language switching, accessibility-related settings, inactivity management, media, and extensive ATL content. Its implementation provides a basis for user testing and for a future production rebuild.

8.3 Media outcome: AI-generated narrative promotion

The AI video extends the project from information retrieval into institutional storytelling. It explores whether a fantasy journey and recurring character can make diverse research projects more accessible and memorable. Even without completed engagement data, the film is a distinct creative output and a useful stimulus for future testing of attract-state design.

8.4 Process outcome: documented AI-assisted development

The project demonstrates how non-specialist or developing programmers can use conversational AI for interface construction, debugging, and iterative design. It also exposes the risks of this approach, including code concentration in one file, hidden dependencies, verification burden, and difficulty tracing why particular implementation decisions were made. The prompt history and revision process should therefore be treated as methodological data.

8.5 Negative result: limits of low-cost 3D reconstruction

The 3D outcome is academically useful because it challenges an initially attractive assumption. A free modelling tool, mobile scanning app, and general-purpose 3D editor did not automatically produce a realistic, usable model. The learning cost, capture fidelity, hardware constraints, and reconstruction effort exceeded the expected benefit. This negative result supports a more proportionate design choice and should be included explicitly in the final presentation.

8.6 Research instruments and future evidence

The project has produced a basis for comparative tasks, a survey, and focus-group discussion. These are not yet research findings, but they are reusable outputs. Section 11 and the appendices refine them into a more rigorous protocol.

9. Strengths

Strength	Evaluation
Clear problem relevance	The project addresses a real institutional communication problem in a public-facing location.
Strong conceptual reframing	The discovery-layer concept prevents the touchscreen from becoming a smaller copy of the full website.
High implementation effort	The prototype contains substantial interaction, content, animation, settings, and local management functionality.
Original creative extension	The AI video adds narrative identity and a distinctive attract-state resource.
Iterative adaptability	The team changed tools when Google AI Studio and SketchUp were not suitable and documented alternative routes.
Honest negative evidence	The 3D difficulties reveal practical limitations and support a more feasible design direction.
Bilingual and shared-device awareness	Language support, reduced motion, settings, and inactivity reset reflect the actual deployment context.

Strength	Evaluation
Potential institutional value	The prototype can support outreach, project discovery, facility awareness, event promotion, and participation pathways.

10. Weaknesses, Shortcomings, and Validity Threats

10.1 Scope overexpansion

The original concept accumulated a 3D map, animated presentation, project gallery, events, facilities, resources, search, AI guide, video, content editor, bilingual support, settings, and a mini-game. This breadth increased creative value but diluted resources from the central research question. A smaller research-ready minimum viable product would have made it easier to complete testing and produce strong evidence.

10.2 Incomplete 3D feature

The lack of a satisfactory 3D map is a significant deviation from the guide and brainstorming. However, it should not be corrected by inserting a low-quality model. A visually inaccurate representation could mislead visitors and reduce trust. The better response is to revise the requirement and explain the evidence behind that revision.

10.3 Content overload may reappear

Although the prototype improves visual consistency, 36 project records and 32 event records may still exceed the needs of a short public interaction. A curated set of flagship projects, current events, and rotating highlights would better match the discovery-layer principle. The full archive can remain available through filters or QR links.

10.4 Technical maintainability

The single-file approach made transfer and local opening convenient, but the 34 MB file and very large inline script create maintainability risks. Future developers may struggle to identify data, styles, interactions, and media dependencies. A production version should separate content data, interface components, style sheets, and media assets while retaining a simple deployment package.

10.5 Security and content governance

The content editor is protected only by a fixed client-side password and stores data locally in the browser. This prevents casual accidental modification but not deliberate access. It also creates version inconsistency across devices. Institutional deployment requires authenticated administration, version history, content ownership, publication status, and rollback.

10.6 Offline reliability and performance

Remote image references and large embedded media make the interface vulnerable to connectivity loss, slow initial loading, and inconsistent browser caching. A public kiosk should load critical content locally, compress media, prefetch essential assets, display graceful fallbacks, and undergo repeated restart and long-duration stability tests.

10.7 Accessibility limitations

The prototype contains meaningful accessibility intentions but has not yet been demonstrated to meet WCAG 2.2. Missing alternative text, absent caption tracks, possible focus-order issues, animation density, physical reach, and untested contrast remain concerns. Accessibility should be treated as a core research criterion rather than a final cosmetic check.

10.8 Methodological weaknesses in the original evaluation plan

Issue	Threat to validity	Recommended correction
Different participant groups for each interface	Differences in familiarity, reading speed, and technical skill may explain performance differences.	Use the same participants for both interfaces with counterbalanced order.
At least seven participants per group	This is acceptable for exploratory observation but weak for reliable quantitative comparison.	Recruit 20 to 24 participants if possible and report uncertainty.
Same tasks repeated	Participants may remember answers or locations during the second condition.	Use matched task sets and counterbalance task-interface assignment.
Unclear definition of a step	Different observers may count taps, scrolls, page changes, and backtracking differently.	Create an operational coding guide before data collection.
Leading comparison survey	Statements framed only as improvements encourage agreement and confirmation bias.	Use balanced wording and validated instruments.
Survey mentions unimplemented features	Participants may rate an imagined 3D map, search function, or chatbot rather than the tested system.	Ask only about features present in the tested build.
Focus group only	Group dynamics can suppress criticism and create conformity.	Combine short individual comments with a moderated group discussion.
No predefined analysis plan	Selective interpretation may occur after results are seen.	Register outcomes, hypotheses, exclusions, and statistical tests before testing.

10.9 AI-specific limitations

- Generated code may contain hidden defects or inaccessible interaction patterns.
- AI-assisted revision can produce local fixes that increase overall architectural complexity.
- Generated visual content may misrepresent the physical ATL environment if realism is assumed.
- Different tools may produce inconsistent character, lighting, scale, and motion across video shots.
- Prompt and model changes reduce reproducibility unless versions and outputs are logged.
- Copyright, source-image permission, and institutional branding require human review.
- AI-generated factual text must be checked against ATL sources before publication.

11. Strengthened User Evaluation Design

11.1 Recommended design

A counterbalanced within-participant comparison is recommended. Every participant uses both the official website and the Live Window. Half use the official website first and half use the Live Window first. Equivalent task sets are rotated so that no participant searches for exactly the same fact twice.

Element	Recommended specification
Participants	Target 20 to 24 participants across students, staff, researchers, and visitors. If fewer are available, frame the results as exploratory and emphasise confidence intervals and qualitative findings.
Conditions	A: current ATL website. B: Live Window prototype on the target touchscreen or a screen matched as closely as possible.
Order control	Randomly assign participants to AB or BA order.
Task sets	Use two matched sets covering contact information, facilities, projects, events, participation, and institutional identity.
Observation	Record success, time, taps, backtracks, errors, hesitation, help, and abandonment.
Questionnaires	Administer SUS and UEQ-S. Add a short direct preference question only after both conditions.

Element	Recommended specification
Qualitative data	Collect individual comments immediately after each condition and conduct a short final interview or focus group.
Analysis	Report medians, interquartile ranges, success proportions, paired differences, effect sizes, and confidence intervals. Use Wilcoxon signed-rank tests when small-sample assumptions for parametric tests are not satisfied.

11.2 Hypotheses

Hypothesis	Statement
H1	Median task completion time will be lower for the Live Window than for the current website.
H2	The number of taps, page transitions, and backtracks will be lower for the Live Window.
H3	Task completion rate will be equal or higher for the Live Window.
H4	The Live Window will receive higher perceived usability and pragmatic-quality ratings.
H5	The Live Window will receive higher hedonic-quality and engagement ratings.

11.3 Suggested task domains

Domain	Example task A	Matched task B
Institutional identity	Find one sentence explaining what ATL does.	Find how ATL is related to the Faculty of Arts.
Contact and access	Find the ATL email address.	Find ATL opening hours or location.
Facilities	Find a facility suitable for immersive or XR work.	Find a room or resource suitable for high-computing research.
Projects	Find a project that uses artificial intelligence.	Find a project related to cultural heritage or 3D documentation.
Events	Find the date of a current or upcoming event.	Find an event or recording related to AI teaching.
Participation	Find how a student can participate in ATL.	Find how staff can seek project or funding support.

11.4 Data coding rules

- Start time begins when the facilitator finishes reading the task and the participant first touches or clicks the interface.
- End time occurs when the participant states the correct answer and the relevant content is visible.
- A tap is one discrete touch on an actionable target. Scroll gestures are counted separately.
- A backtrack occurs when the participant returns to a previous level after entering an unhelpful route.
- An error is a selection that moves the participant away from the target information or produces an incorrect answer.
- A task is abandoned when the participant stops or reaches a pre-agreed maximum duration, such as three minutes.
- Facilitator assistance must be recorded and treated as unsuccessful independent completion.

11.5 Quantitative analysis

For each task and interface, report completion rate, median completion time, median taps, median backtracks, and the distribution of errors. Analyse paired participant differences rather than comparing only group averages. Report effect sizes and confidence intervals because statistical significance alone is not an adequate indicator of practical improvement. SUS scores should not be interpreted as percentages. UEQ-S pragmatic and hedonic scores should be reported separately.

11.6 Qualitative analysis

Interview and comment data should be analysed through a transparent thematic process. Researchers should familiarise themselves with the data, generate initial codes, group related codes into candidate themes, review the themes against the full dataset, define each theme, and select concise supporting quotations. Likely sensitising topics include orientation, visual clarity, trust, motion, content density, spatial understanding, accessibility, and preference for media versus text. These should not be imposed as final themes before analysis.

11.7 Results reporting template

Outcome	Official website	Live Window	Paired difference	Interpretation
Task success	[Insert n and %]	[Insert n and %]	[Insert]	[Do not complete before testing]
Median time	[Insert seconds]	[Insert seconds]	[Insert seconds]	[Insert effect and uncertainty]
Median taps	[Insert]	[Insert]	[Insert]	[Insert]
Median backtracks	[Insert]	[Insert]	[Insert]	[Insert]
SUS score	[Insert]	[Insert]	[Insert]	[Insert]
UEQ-S pragmatic quality	[Insert]	[Insert]	[Insert]	[Insert]
UEQ-S hedonic quality	[Insert]	[Insert]	[Insert]	[Insert]

12. Technical, Ethical, and Operational Risk Register

Risk	Likelihood	Impact	Priority response
Outdated or inaccurate ATL content	High	High	Assign content owners, review dates, and automatic archive rules.
Remote image or video failure	Medium to high	High	Package critical assets locally and provide fallbacks.
Slow load or browser crash	Medium	High	Compress media, split code, test cold starts, and monitor memory use.
Unauthorised content modification	Medium	High	Replace client-side password with authenticated administration and audit logs.
Device-specific display or touch failure	Medium	High	Test on the exact screen, resolution, browser, and operating system.
Accessibility exclusion	Medium	High	Conduct WCAG and physical-reach audits, add captions, alt text, and a list-view alternative.
Misleading 3D or AI imagery	Medium	Medium to high	Label creative interpretation, verify spatial facts, and avoid presenting fantasy imagery as documentary evidence.
AI chatbot hallucination in a future phase	High	High	Use a verified knowledge base, source links, retrieval grounding, refusal rules, and content-owner review.
Loss of local editor data	Medium	Medium	Export backups, use versioned JSON or a server store, and test recovery.
Insufficient user-study sample	Medium	High	Recruit early, simplify the protocol, and frame small results as exploratory.
Privacy leakage between users	Low to medium	High	Reset sessions, avoid personal data, and clear future search or chat history.

Risk	Likelihood	Impact	Priority response
Unclear AI media provenance	Medium	Medium	Maintain a tool, model, prompt, source, edit, and approval log.

13. Recommendations and Development Roadmap

13.1 Priority 1: complete the research-ready minimum viable product

- Freeze the tested feature set. Do not add search, chatbot, or additional games before the main comparison study.
- Replace the unsatisfactory 3D requirement with a 2.5D floor plan using labelled rooms, photographs, and touch hotspots.
- Curate the first release to approximately 8 to 15 flagship projects and no more than five current events.
- Add captions or a transcript to the promotional video and alternative text to meaningful images.
- Package all critical assets locally and test the interface without internet access.
- Create a fixed testing build and record its version before collecting data.
- Conduct the counterbalanced usability study and complete the analysis before making effectiveness claims.

13.2 Priority 2: production hardening

- Separate content data, styles, scripts, and media from the monolithic HTML file.
- Move project, event, resource, and people records into validated JSON or a lightweight content service.
- Implement secure authenticated editing, version history, approval, and rollback.
- Configure browser or operating-system kiosk mode and automatic restart after failure.
- Add error logging, asset fallbacks, and a visible reset control.
- Test loading, memory, touch accuracy, screen reach, brightness, and motion on the installed device.
- Create a content governance schedule with named owners and expiry rules.

13.3 Priority 3: optional enhancement phase

- Add touch-friendly search only after a canonical content database exists.
- Develop an AI guide only when answers can be grounded in approved ATL records and linked to sources.
- Allow future search or AI responses to open the relevant project, facility, or map hotspot directly.
- Evaluate whether the mini-game supports ATL discovery or distracts from the core task.
- Test the promotional video as an attract-state intervention through observation of approach and interaction rates.
- Revisit 3D only if accurate floor-plan data, appropriate capture hardware, specialist skills, and sufficient time become available.

13.4 Recommended 3D alternative

Layer	Recommended implementation
Base	A clean floor plan or simplified axonometric illustration based on verified room boundaries.
Spatial cues	Room labels, colour-coded zones, entrances, and major facility icons.
Interaction	Large hotspots with visible hover-independent touch feedback, zoom, back, and reset.
Media	Real photographs and short walkthrough clips that show actual rooms and equipment.
Information	One-sentence function, access route, example project, and QR code for detailed booking information.

Layer	Recommended implementation
Accessibility	A parallel two-dimensional list that reaches the same room content without spatial navigation.

13.5 AI process documentation

The final research submission should include an AI use statement and process appendix. For each tool, record the task, model or version when known, representative prompts, selected output, rejected output, human modifications, factual verification, and final approval. This makes the workflow reproducible and demonstrates that human judgement remained central.

14. Conclusion

Live Window is a strong and ambitious response to a genuine institutional communication problem. The project has successfully moved beyond the concept stage and produced a functional, content-rich, bilingual touchscreen prototype with an original AI-generated promotional film and several kiosk-oriented behaviours. The team also conducted meaningful problem investigation and developed a coherent principle for separating public discovery from the full institutional website.

The project is not yet complete in research terms. Its most important original claim concerns improved retrieval efficiency, but no valid comparative evidence has yet been produced. The interactive 3D map, search engine, AI guide, secure content-management system, production deployment, and full accessibility validation are also incomplete. The unsuccessful 3D modelling work should be presented honestly as a negative result that led to a more feasible 2.5D recommendation.

The most defensible final positioning is therefore an advanced functional prototype and Research through Design study at approximately 60 per cent maturity against the original full brief. The immediate priority is not to add more features. It is to stabilise a focused test build, conduct a rigorous counterbalanced user study, and convert the prototype into evidence. If these steps are completed, the project can make a credible contribution to research on public university touchscreens, AI-assisted design practice, and the communication of interdisciplinary arts-technology work.

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Appendix A. Detailed Completion and Evidence Matrix

Requirement	Original expectation	Current evidence	Status	Next evidence needed
Animated public display	Attract passers-by and show ATL highlights.	Animated opening, category transition, visual effects, and promotional video.	Advanced	Walk-up engagement observation.
Project discovery	Browse selected project details and videos.	36 project records with ongoing and completed groupings.	Advanced but overinclusive	Curated flagship set and task testing.
Event discovery	Show current programmes and events.	32 event records across three groupings.	Advanced but archive-heavy	Current/archive rules and content-owner review.
About ATL	Explain ATL identity, mission, and Faculty relationship.	About section and related content implemented.	Advanced	Comprehension testing.
Facilities	Support discovery of spaces and technologies.	Our Lab content exists, but no completed spatial interface.	Partial	2.5D plan and facility tasks.
3D map	Interactive ATL floor map with navigation.	No functional GLB or Three.js integration. Multiple unsuccessful modelling trials.	Incomplete	Revised 2.5D implementation or specialist 3D resources.
Video	Short ATL and project media.	57-second AI-generated promotion film.	Advanced	Captions, provenance, and engagement test.
Search	Touch-friendly retrieval across content.	Not present.	Not implemented	Canonical database and search design.
AI guide	Answer questions and guide users to content.	Not present.	Not implemented	Grounded knowledge base and safety design.
Accessibility	Clear controls, readable text, reduced motion, and inclusive access.	Language, settings, reduced-motion CSS, and large controls exist. Some alt text and captions absent.	Partial	WCAG audit and target-device testing.
Content updating	Easy maintenance and future expansion.	Local IndexedDB editor with fixed password.	Partial	Secure shared administration and governance.
Kiosk deployment	Run locally in locked browser mode.	Local browser operation is possible. Kiosk enforcement is external.	Partial	Target-device installation and restart testing.

Requirement	Original expectation	Current evidence	Status	Next evidence needed
Comparative experiment	Compare time and steps on website and Live Window.	Survey and task concepts exist. No valid results supplied.	Incomplete	Counterbalanced test and analysis.

Appendix B. Participant Task Sheet

Participant ID: ________ Condition order: AB / BA Date: ________ Facilitator: ________

Task	Interface	Task set	Success	Time	Taps	Backtracks	Errors	Help	Notes
1. Institutional identity		A / B							
2. Contact or location		A / B							
3. Facility		A / B							
4. Project		A / B							
5. Event		A / B							
6. Participation route		A / B							

Use the operational definitions in Section 11.4. Do not provide assistance unless the task is stopped and assistance is recorded.

Appendix C. Revised Post-Test Questionnaire

Use a five-point response scale unless otherwise stated: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree.

1. I could understand what ATL does from this interface. 1 2 3 4 5
2. The main categories were easy to understand. 1 2 3 4 5
3. I could tell which elements were interactive. 1 2 3 4 5
4. The text was concise enough for a public touchscreen. 1 2 3 4 5
5. The interface gave clear feedback after I touched a control. 1 2 3 4 5
6. I could recover easily when I entered the wrong section. 1 2 3 4 5
7. The visual design was consistent across sections. 1 2 3 4 5
8. The motion and transitions supported rather than interrupted my task. 1 2 3 4 5
9. The interface made ATL projects and facilities feel engaging to explore. 1 2 3 4 5
10. I would feel confident using this interface without assistance. 1 2 3 4 5
11. The amount of content felt appropriate. 1 2 3 4 5
12. I would use this interface to learn about ATL during a visit. 1 2 3 4 5
13. Which interface did you prefer overall? Official website / Live Window / No preference
14. What was the most helpful feature? ______________________________________
15. What was the most confusing or frustrating part? ____________________________
16. What is the single most important improvement? ______________________________

Administer the standard SUS and UEQ-S separately using their official wording and scoring instructions. Do not modify validated items without documenting the change.

Appendix D. Focus-Group or Interview Guide

1. Describe your first impression when you approached the Live Window.
2. How did you decide where to touch first?
3. Which information was easiest to find and why?
4. Which information was difficult to find and why?
5. Did the animations help you understand the interface or distract you?
6. How did the amount of text and the size of controls affect your use?
7. Did the video improve your understanding of ATL or mainly create atmosphere?
8. Would a floor plan or spatial map be useful? What level of realism would you need?
9. Which content should be removed, shortened, or prioritised?
10. How should the touchscreen connect to the full website or other ATL services?
11. What accessibility or language changes would make the interface easier to use?
12. What is the one change that would most improve the experience?

Appendix E. AI Tool and Media Provenance Log

Date	Tool and version	Task	Prompt or instruction summary	Output selected	Human edits and verification	Final use
	ChatGPT Plus	Touchscreen coding				
	ChatGPT Plus	Concept development				
	DeepSeek	Concept development				
	TapNow	AI media generation				
	Seedance 2.0	AI video generation				
	Gemini	AI media workflow				
	CapCut	Video editing				

Attach representative prompts and before-and-after examples where possible. Record rejected outputs when they illustrate a significant limitation or design decision.

Appendix F. 3D Experiment Log and Decision Record

Date	Tool	Input and device	Objective	Observed result	Technical constraint	Decision or next step
	SketchUp Free		Create simplified ATL model	Learning process too demanding for schedule	High learning cost	Discontinued
	Polycam	Mobile phone	Scan real ATL spaces	Geometry and textures insufficiently faithful	Sensor and hardware limits, indoor capture conditions	Discontinued for final representation
	Image references	ATL photographs	Increase visual realism	Images did not reproduce spatial reality adequately	Incomplete spatial information	Use only as supporting media
	Blender	Combined indoor assets	Repair and integrate environments	Result remained below expected fidelity	Manual reconstruction complexity and weak source geometry	Recommend 2.5D plan