SPLAT! A Web3D Platform for Exploring Intangible Cultural Heritage through Interactive Storytelling and 3D Visualization

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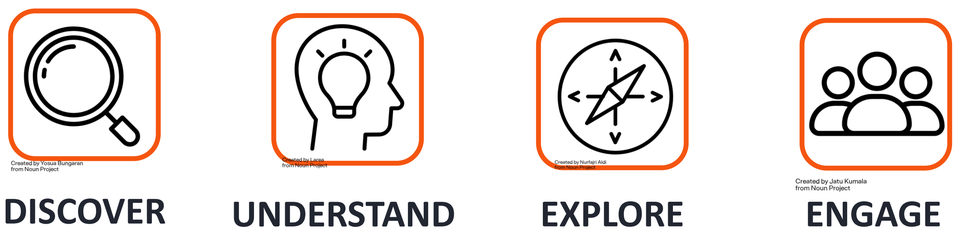
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1. Background & Motivation

Intangible Cultural Heritage (ICH) is shaped by participation, transmission and social context, making festivals and rituals difficult to communicate through conventional web content. Web technologies can broaden access to cultural heritage, but meaningful interpretation can't always be ensured. In this context, SPLAT! explores how Web3D can move beyond visual representation by connecting 3D objects with narratives, places, symbols and user interaction. The aim is to provide a reusable framework for exploring geographically distributed ICH through storytelling, spatial exploration, multimedia and web-based interactive activities.

2. Methodology

SPLAT! follows a Research through Design approach with a content-first process. The interface was shaped by its content (cultural narratives, spatial information, media etc.). Seven friendly battle festivals were presented, with Ivrea Carnival as the primary case study. The resulting platform present 4 progressive interaction layers:

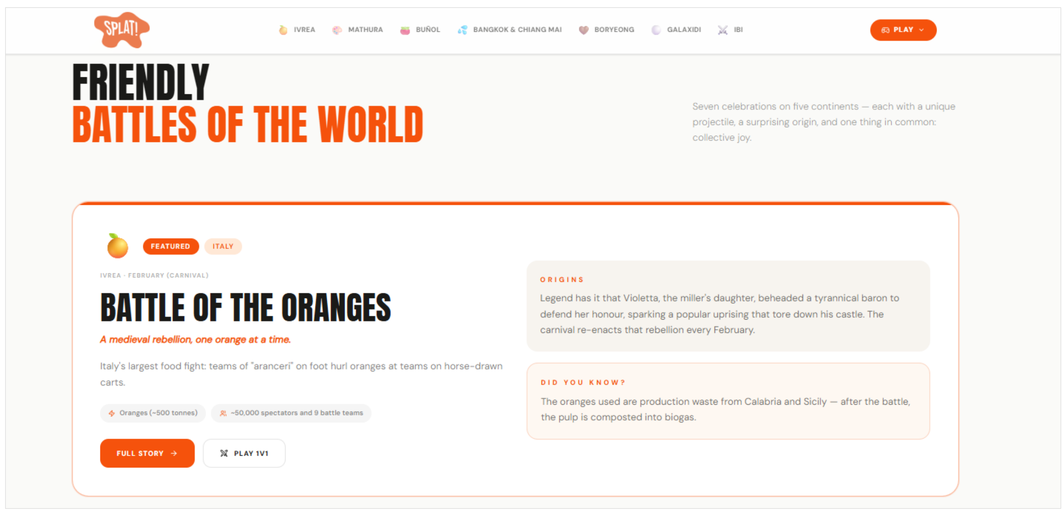


From a technical perspective, SPLAT! exploit the following implementation stack:

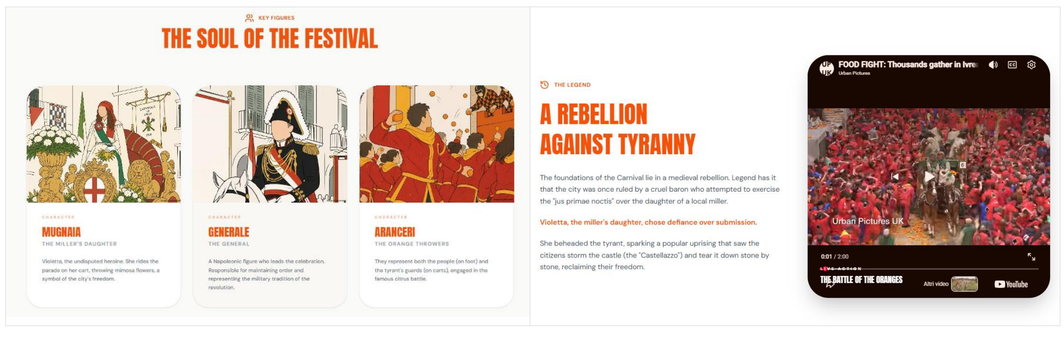
Components	Technology	Role in the prototype
UI framework	React 19 + TypeScript	Component-based interface, typed props, and a strongly structured cultural data model.
Build and routing	Vite 6 + React Router DOM v7	Fast development workflow, optimized client build, and route-level separation between generic and specific festival pages
3D rendering	Three.js + React Three Fiber + Drei	Browser-native 3D scenes, camera controls, GLB loading, lighting, hotspots, and declarative integration with React
Maps implementation	QGIS	Creation of thematic and informative maps
Interaction and media	Matter.js, Web Audio API, HTML audio	Physics-based mini-game logic, synthetic audio fallback, and playback of real sound files where available
Interface	Tailwind CSS v4, Motion, lucide-react	Responsive design tokens, animated transitions, consistent icons, and reusable micro-interactions

3. Results and Discussion

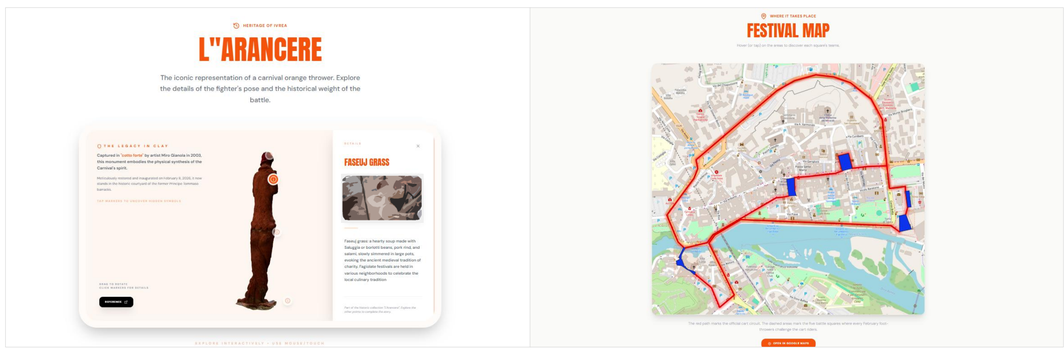
SPLAT! brings seven friendly battle festivals into a shared web-based environment, combining cultural storytelling, multimedia, spatial exploration and interactive 3D content.



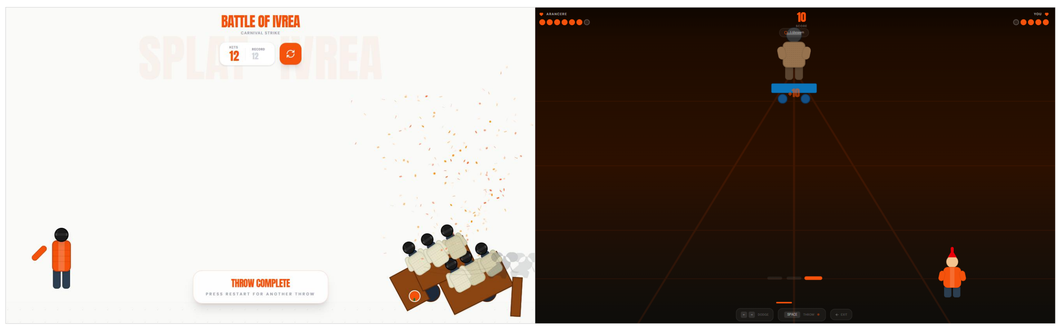
The Ivrea experience progressively moves from cultural storytelling to interactive exploration. Key figures and historical narratives introduce the festival and its civic context, complemented by multimedia resources.



The Arancere 3D model connects physical elements with historical and symbolic meanings through interactive hotspots, while the festival map links the spatial setting.



Browser-based games further extend the experience. Together, these components show how web technologies can support ICH interpretation when multiple resources are connected into a narrative and engaging environment.



4. Conclusion and Future Development

SPLAT! demonstrates how a modular web-based platform can integrate storytelling, spatial exploration, multimedia and interactive 3D content for intangible cultural heritage. Future work will focus on user-centered evaluation, stronger content governance, accessibility and performance, selective XR integration, and AI-assisted cultural mediation.

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