Galvia. DIGITAL

CASE STUDY

FLAX & TEAL

arches®

Heritage in Your Pocket: Developing A Mobile, Offline-Capable, Field App for Arches

AT A GLANCE

Galvia Digital supported Flax & Teal in building a custom mobile app for the Arches platform named Extrados, designed for use in the field by archaeologists and licensing officers. The goal was to streamline offline data entry for heritage assets. Flexibility for out-in-the-field usage needed to be paramount, as the system would be used in areas with limited or no internet access.

Project Duration: 4 Months

> " Galvia Digital brought deep technical expertise and flexibility to a tricky problem. They helped us turn a complex system into something practical and user-friendly for field teams. The Extrados app is to be an important part of how our government customers will manage heritage data going forward. "
>
> Phil Weir, Director, Flax & Teal

→ CHALLENGES

- **F&L's Government client needed a reliable, offline-capable, user-friendly tool for their Coral-Arches setup.**
- **An earlier mobile app was outdated and had to be rebuilt from scratch.**
- **Field users were not data experts; simplicity and intuition were critical.**
- **Development had to avoid disrupting existing Arches projects in active use.**

→ SOLUTIONS

Galvia Digital developed Extrados, a simple, reliable MVP mobile app for field data capture. Built with Vue.js, Ionic, and Capacitor, it supports offline use, maps, and device features. A custom sync engine and careful integration with Coral ensured smooth operation without disrupting Arches workflows.

Galvia. DIGITAL

galviadigital.com

650 HOURS

Saved thanks to Galvia Digital's Developers

100% OFFLINE CAPABILITY

Field data collection, even without signal, fully supported by design

Galvia. DIGITAL

CASE STUDY

→ RESULTS & BENEFITS

01 Built for the Field, Ready for Reality

Made for archaeologists and licensing teams—easy to use, works offline, and fits seamlessly into everyday fieldwork.

02 True Offline Capability

Offline access to forms, data, and detailed maps. Smart caching and syncing meant the app kept working, no signal required.

03 Streamlined Data Collection

Form-based input made recording new or existing heritage assets quick, clean, and intuitive—no database expertise needed.

04 Seamless System Integration

Integrated with Coral without disruption and built on a stack ready for future expansion, including Progressive Web App support.

TECH INVOLVED

- VUE.JS
- ANDROID STUDIO / XCODE
- OAUTH
- JavaScript
- HTML
- CSS
- LEAFLET & OPENSTREETMAP
- IndexedDB

How can we help?

Bespoke Software Solutions For Your Business. Contact Us For a Free Diagnostic Call!

+44 77 330 100 28

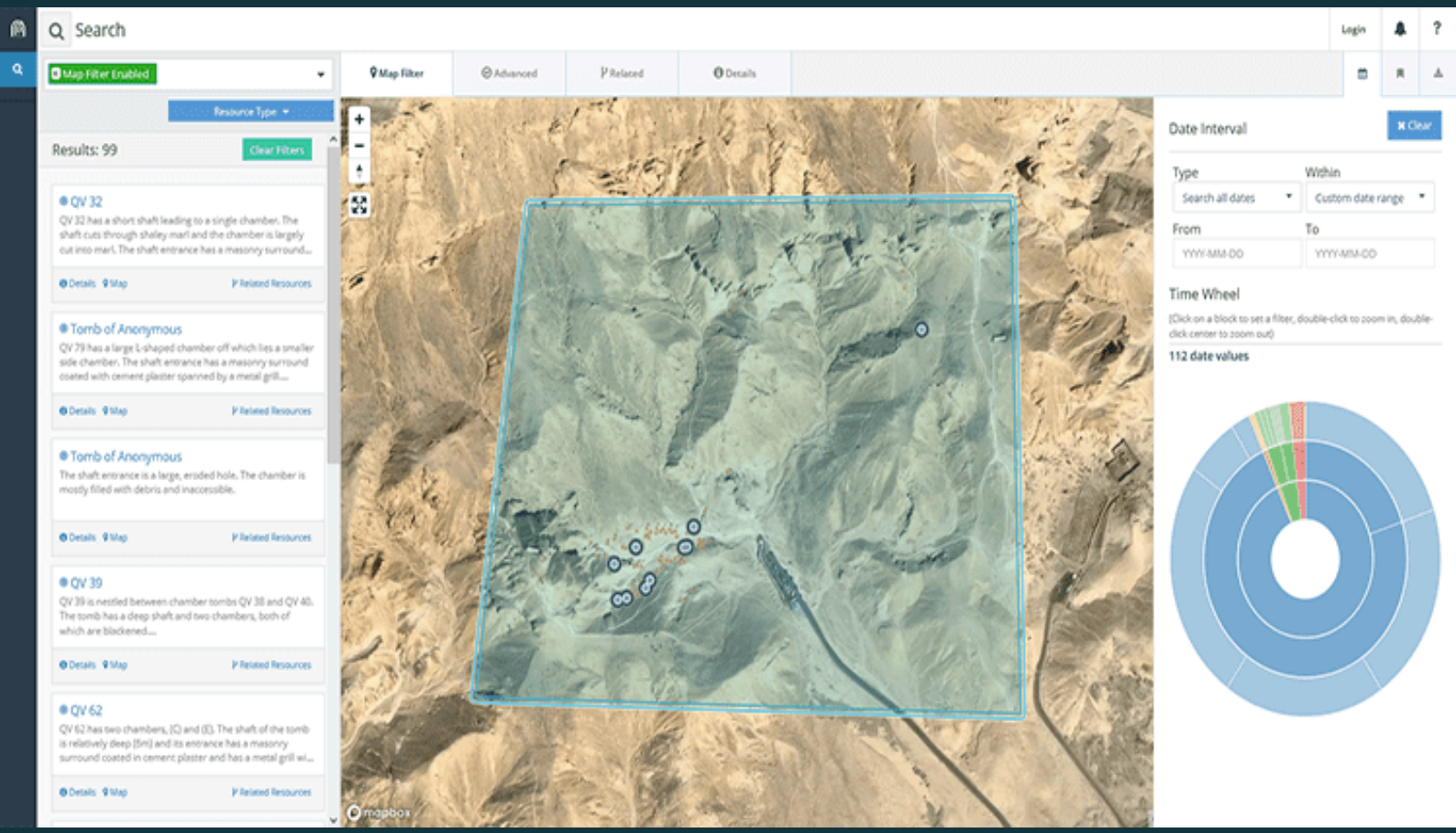
info@galviadigital.com

galviadigital.com

Galvia.
DIGITAL

CASE STUDY

WHAT IS ARCHES & CORAL?



Arches is an open-source platform built to manage cultural heritage data at scale. It's designed around structured, ontology-rich records. Things like historic buildings, protected sites, and conservation information.

Under the hood, Arches uses PostgreSQL as its database and ORM to connect its models to SQL. That setup allows developers to work with high-level data structures while the system handles all the translation to database queries in the background.

Coral is a custom implementation of Arches developed for a government body. It builds on the Arches core but adds a layer of accessibility for non-technical users.
Through workflows and custom interfaces, Coral lets archaeologists, planning officers, and other civil servants interact with structured records in a way that feels natural, without needing to understand the underlying schema or database design.

While Arches provides the foundation, Coral shapes it into a day-to-day working tool.

+44 77 330 100 28
info@galviadigital.com

Galvia. DIGITAL

CASE STUDY

PROJECT OVERVIEW

The Extrados mobile app was developed by Galvia Digital in partnership with Flax & Teal to support a government body. Built as part of the broader Coral initiative, a customised deployment of the Arches heritage database, the app addressed a clear operational gap: collecting and managing heritage asset data in the field, without internet access.

Designed specifically for archaeologists and licensing officers, Extrados made it possible to complete workflows, log site data, and navigate maps offline.

The app simplified the process of capturing structured information about immovable heritage assets, such as historical buildings and archaeological sites, while maintaining full compatibility with Coral's complex data model.

Delivered as a minimum viable product (MVP), Extrados used modern web technologies paired with mobile-native features.

Despite being lightweight and highly focused, it laid a strong foundation for future development, including potential decoupling from Coral and expansion into a Progressive Web App to serve a broader user base across the Arches community.

FLAX & TEAL

Flax & Teal is a leading software consultancy dedicated to the digital preservation of cultural heritage. As registered suppliers and contributors to Arches — an open-source platform designed for managing immovable heritage assets like historic buildings and archaeological sites — Flax & Teal works with institutions across government, academia, and conservation to securely manage and enrich complex datasets.

Duration: The project was delivered in under 3 months

WHAT WAS THE PROBLEM?

Heritage teams needed to log complex asset data in remote areas. Without Wi-Fi, laptops, or full Arches access.

Arches was built for deep ontological analysis, not quick field updates.

Its previous mobile tool wasn't completed. Field reporting was fragmented, clunky, and not built for where the work actually happened.

UNDERSTANDING THE PROBLEM

Archaeologists, licensing teams, and heritage officers had to inspect sites, record observations, and sync them with the main Arches system.

But there was no mobile interface. Arches' power lies in its flexible data model, but using it in a browser on a tablet, with limited signal, complex forms, and deep ontologies, was a non-starter in the field.

The workflows added through the Coral project brought it closer to non-specialist usability, but the gap remained: real-world, on-site conditions just didn't suit a desktop-first platform.

The Government Client and other heritage groups couldn't reliably record what they saw or access data on-site, which meant potential data loss, rework, and long delays syncing insights from field to system. Galvia was brought in to build a bridge.

THE CHALLENGES

- Arches' architecture was too complex for mobile use, with no ORM and tightly coupled front/back ends.
- Previous mobile solution had been discontinued; there was no viable fieldwork tool.
- Users needed offline functionality, map access, and the ability to edit or create resources in harsh environments.
- Legacy workflows had to be preserved, this wasn't a fresh start; it had to work with what already existed.

OUR APPROACH

1. Field-First Discovery Framed the Build

We started by analyzing what would actually be happening in the field by users. Sites with zero signal, users with minimal tech training, and existing workflows built for desktop use.

This meant building offline-first, not just offline-capable, and ruling out heavier mobile architectures that couldn't guarantee resilience in tough conditions.

2. Reverse-Engineering Arches' Complexity

Arches uses a custom ORM, but it's deeply integrated and not designed for external app development. Accessing or modifying data required working around nested relationships, UUID references, and schema logic that wasn't easily decoupled. We created a lightweight internal mapping system in the app to replicate only what was necessary, reducing overhead while staying fully compatible.

3. Building for Limited Windows and Legacy Stability

Development was done in irregular bursts over two years, so the build had to be modular, testable, and fail-safe. At the same time, Coral was a live system. We couldn't break workflows already in use. So we avoided any server-side modifications, authenticated using Arches tokens, and synced via non-invasive API calls with full fallback logic.

4. Offline Sync and Mapping Under Real Constraints

Given offline workflows were a necessity, we used browser-native storage (LocalStorage and IndexedDB) to track user changes and store map tiles.

Our caching system recorded tile requests and stored responses manually, allowing full offline maps without relying on unpredictable browser caching or third-party GIS tools.

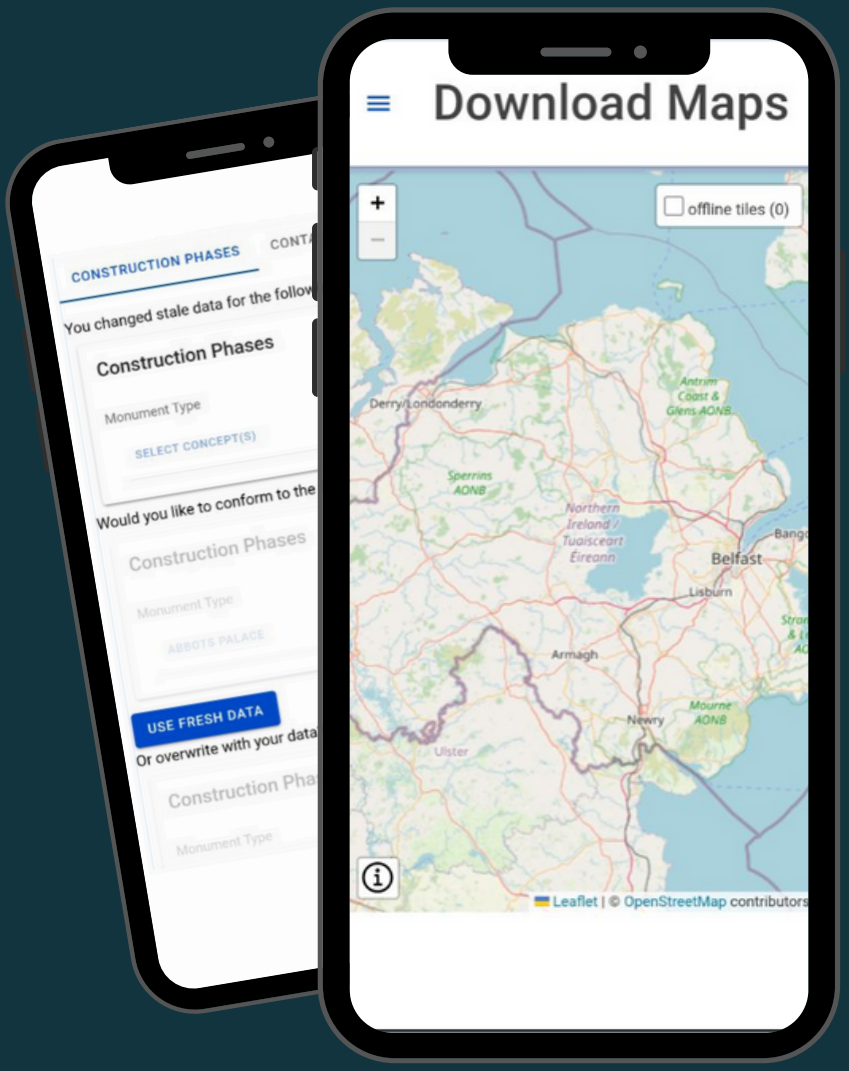
Galvia. DIGITAL

CASE STUDY

THE END PRODUCT

A Mobile App Purpose-Built for Arches

We built a mobile app, Extrados, from the ground up using Vue.js, Capacitor, and the Ionic framework, packaged via Android Studio and Xcode for native deployment. It was designed to support Arches' complex ontology-driven data model without requiring users to understand its backend. Instead of exposing the raw system, Extrados used Coral's workflow layer to simplify input into clean, mobile-friendly forms that could be filled in quickly, even in the middle of a site inspection.



Robust Offline Functionality with Local Storage and Sync

Extrados was engineered to work entirely offline. It cached workflows, user sessions, and even form logic locally using browser-native storage (LocalStorage for workflows and IndexedDB for larger objects like maps). A custom-built sync engine tracked edits and submissions, queuing changes in a local "outbox" until a connection was available. This eliminated reliance on real-time connectivity, ensuring that data entry could happen anywhere without loss.

Custom Offline Mapping Engine

We implemented offline mapping using Leaflet and OpenStreetMap tiles, saving map sections to the device on request. When users saved a location area, we intercepted tile requests, stored their URLs and images in IndexedDB, and created a local fallback system. If a tile request failed due to being offline, Extrados would automatically check its offline cache and render it. This approach gave users full map detail down to zoom level 18 with no external dependencies.

Seamless Coral Integration with Zero Backend Changes

To ensure stability, Extrados was designed to sit entirely on top of the Coral instance without requiring any changes to the server-side Arches deployment. It authenticated via token-based login, pulled existing workflows through the Coral Workflow Builder, and synced resource data through standard Arches APIs. The client didn't have to rebuild or re-architect anything. We worked with what was there and extended it safely.

Structured Conflict Resolution & Future-Proofing

Data conflicts, especially in low-connectivity workflows, can be a nightmare. We addressed this by implementing card-level diffing and resolution logic. If a resource had changed in Arches since it was downloaded,

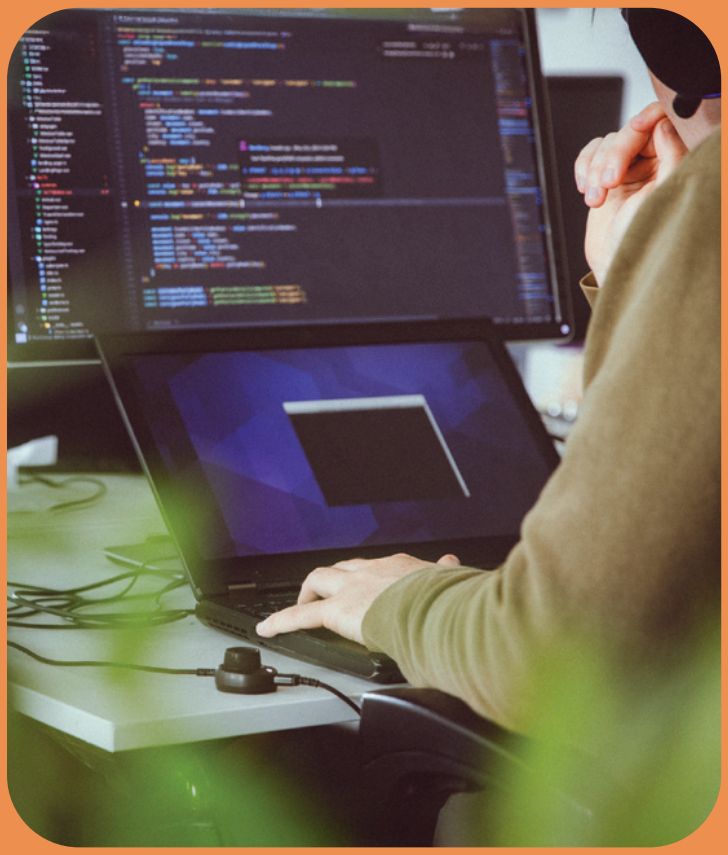
Extrados flagged the difference, showed both versions, and let the user decide what to keep. Nothing was overwritten without intent. The app's modular architecture also supports future decoupling from Coral, making it a strong candidate for a standalone Progressive Web App serving the wider Arches community.

+44 77 330 100 28 info@galviadigital.com

Galvia. DIGITAL

CASE STUDY

BUSINESS OUTCOMES



Delivered a stable, field-ready app that extended Coral's capabilities without altering core systems.

Enabled efficient, offline data capture, reduced manual entry, and improved turnaround time for heritage asset reporting, laying the foundation for broader adoption across Arches-based platforms.

"Galvia Digital brought deep technical expertise and flexibility to a tricky problem. They helped us turn a complex system into something practical and user-friendly for field teams. The Extrados app is to be an important part of how our government customers will manage heritage data going forward."

Phil Weir, Director, Flax & Teal

How can we help?

Need to take a complex system into the field?

Galvia Digital builds custom, offline-capable mobile tools that work with your existing platforms—no rebuilds, no disruption.

From MVPs to scalable PWAs, we help teams capture critical data wherever they are.

Contact Us For A Free Consultation!

Galvia. DIGITAL

+44 77 330 100 28

info@galviadigital.com