

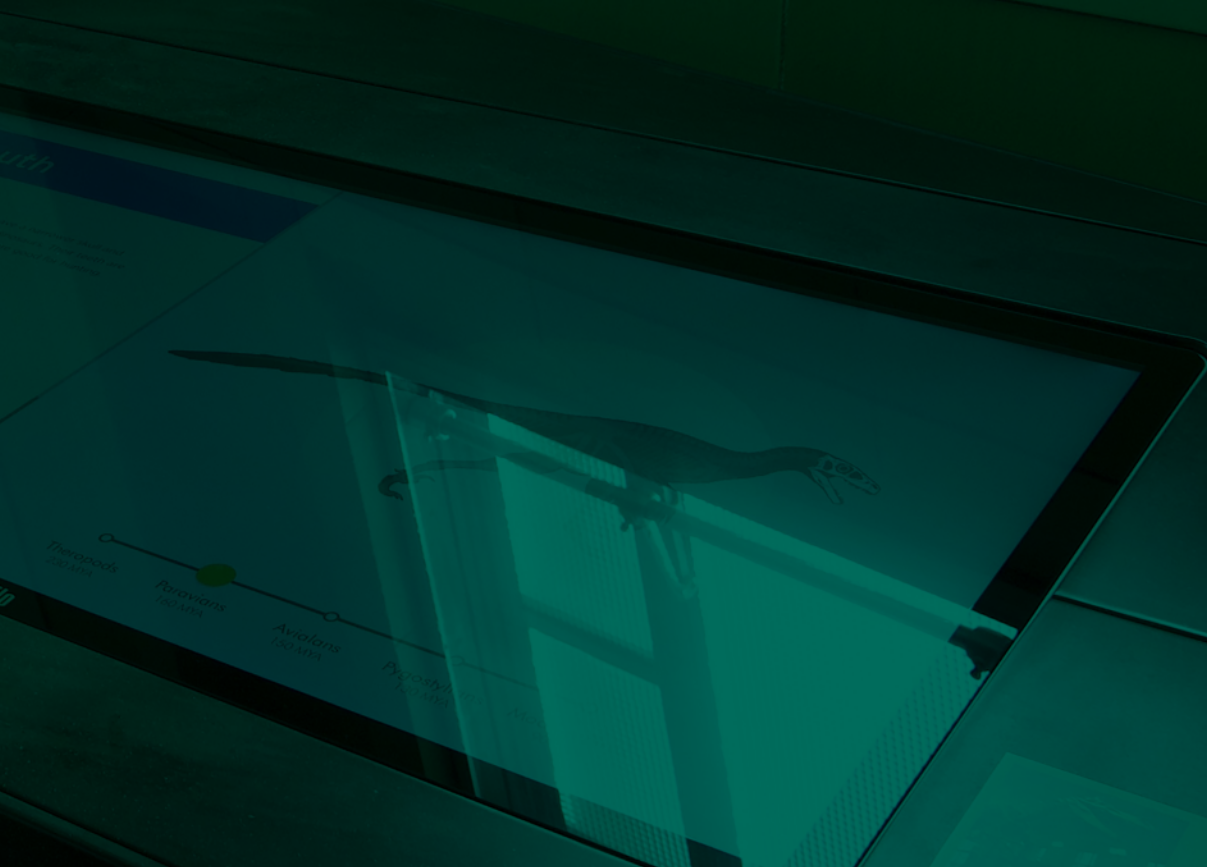
A guest experiences the CMC In Hand app on a recent visit.



Archaeopteryx skeleton
Archaeopteryx lithographica
Jurassic Period, approx. 150 million years ago
Solnhofen Formation, Bavaria, Germany
... considered to be among the first birds.
...ologists now recognize Archaeopteryx
...ing dinosaur. It lacked a strong
...e for anchoring the large muscles
...r flapping wings.

EXPERIENCING CINCINNATI MUSEUM CENTER IN THE PALM OF YOUR HAND

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Cincinnati Museum Center (CMC) spent the past five years restoring and reanimating Union Terminal, the historic Art Deco gem of a train station that houses our history, children's, and natural history museums (fig. 1). We removed or renovated 25-year-old exhibits and designed more than 75,000 square feet of new galleries to engage a public, which we learned from evaluation, was hungry for interactivity.

As 2020 began, we were excitedly planning new projects with ambition and momentum. Then suddenly, we had to think differently.

Reimagining Engagement

In the interest of guest, staff, and volunteer safety and with guidance from local health officials, CMC closed to the public on March 14, 2020, due to concerns about the spread of COVID-19. Union Terminal remained closed for four months. CMC staff pivoted to delivering programs remotely while continuing to plan for a future when we would return to in-person visits. As we prepared to reopen, medical advisors recommended eliminating all physical touch throughout the museums. After spending years thinking about how to make exhibits more interactive through physical design (such as bronze models, flipbooks, and button-operated sensory stations) and technology (including touchscreens), our new challenge was to offer the kinds of inquiry and engagement that are at the core of our reenvisioned experiences without relying on touch.

This challenge gave us an opportunity to revisit conversations about creating a CMC app. Some staff members believed we needed an app to be competitive. Others were skeptical about museum apps – with questions about costs, upkeep, and guest willingness to add another app to their devices. Guest-facing staff had wanted ticket sales and maps. The exhibits team had been eager to experiment with virtual reality. The IT team had



Fig. 1.
Cincinnati Museum
Center at Union
Terminal.



Fig. 2. “Birds are Dinosaurs,” which illustrates evolutionary change, is one of the touchscreen experiences we migrated to CMC In Hand.

been upgrading core systems and anticipating an app project in the future. The idea of an app had become our conceptual junk drawer. Guests rarely asked for one, and we hadn’t yet surveyed them about their preferences.

The charge to reopen without touch-based experiences quickly focused our priorities. We believed that we could deliver many of our touch-based exhibits through personal devices. The Pew Research Center reports that smartphone ownership is rising rapidly, with 81 percent of American adults owning smartphones in 2019.¹ This gave us confidence that most guests would be able to access content we converted to a mobile experience. In just a few months, we went from thinking about having an app someday to a robust “CMC In Hand” mobile experience that recreates more than 35 of our guests’ favorite gallery experiences. And we realized the project for \$50,000, roughly a quarter of what we had previously estimated for building an app.

Concerns about COVID-19 threatened to eliminate many of the exhibits that have been most popular since we reopened post-restoration. A new touch-free reality pushed us to be creative in imagining new ways of connecting with our guests, both on- and off-site. CMC’s agile and affordable approach to developing an app allowed us to have a robust experience ready to go as we reopened to the public. We are planning for its long-term integration into the museum’s offerings.

Building a Team and Setting Strategy

Our initial app-development team relied on in-house expertise, supplemented by our long-term contract web developer. Cincinnati Museum Center’s chief technology officer and senior project director for exhibits partnered to spearhead the effort. They were joined by a designer, AV/IT coordinator, and content developer. Together we laid out the parameters: it should be affordable, a quick build, and serve CMC not just in

touch-free times but beyond. The team held weekly meetings to plan, review progress, and engage in testing and refining the user experience. With limited access to the public, the team considered diverse guest personas and tried to account for the many perspectives guests would bring.

The project began with a survey of exhibits to consider what would need modification in a touch-free environment. We decided that some experiences, such as our *Science Interactives* hall (no artifacts, many high-touch experiences) and the immersive part of our *Cave* exhibition (narrow passages, hard to social distance), could not reopen under these conditions. We identified other opportunities that we could modify and preserve without touch – for example, replacing buttons with touch-free infrared sensors.

Exhibits that we couldn't modify to make touch-free – but we believed could be delivered digitally – became the focus for CMC In Hand development. Sixteen touchscreen exhibits fell into this category, including interactive maps, quizzes, and experiences that show geologic and evolutionary changes over deep time (fig. 2). Three multimedia shows that play aboard a 19th-century streetcar (that visitors can no longer board due to COVID-related proximity concerns) were good candidates. So was the audio guide for our featured (traveling) exhibition about the Maya civilization, since high-touch headset rentals aren't currently feasible. Ten flipbooks and a lenticular display that requires physical manipulation to switch between an above-and below-ground scene within a cave ecosystem were also identified for migration to the CMC In Hand experience.

With our goals focused and priorities established, we set about defining how CMC In Hand would function. We decided to build it as a mobile-friendly website, a strategy we could execute with our team's abilities. A mobile website had the advantage of providing users of all types of devices equal access. It also avoided building separate apps for Android™ and Apple® devices, seeking approval, and supporting parallel apps for the two most common platforms. This approach also means that the analytics we collect about usage are all in one place and are consistent across all of the pages, making learning from user trends clearer and simpler.

Approximately 75 percent of our spending went toward contracts for migrating and preparing files for this new mobile use.

Building and designing the new site framework took our contract web developer two dedicated weeks. This highly efficient process was aided by an early decision to build the mobile site in a WordPress environment. WordPress is an open-source content management system that enables content managers to update it without knowing how to code. Several team members had previous experience with WordPress, which gave us confidence in adding and maintaining content after the developer built the site architecture.

While back-end development was underway, others on the team began to prepare the

content. The senior project director of exhibits reviewed contracts for clauses that might restrict the reuse of content in a mobile format. The exhibit content developer considered modifications that would be necessary due to the format change. The exhibits AV/IT coordinator prepared flipbooks and media files for mobile delivery. For more complex touchscreen experiences built in Unity (a game-engine platform), the senior project director of exhibits engaged the original creators or other partners to repackage content for CMC In Hand. Approximately 75 percent of our spending went toward contracts for migrating and preparing files for this new mobile use. Preparing these files for mobile delivery is also where we invested the most time in this process.

We also tested, tested, and tested. We borrowed phones, resurrected old models, and generally tried to turn up any weak points.

We hired several firms to transition large-format touchscreens in our physical exhibits into mobile-screen formats. Partners at Balance Studios, Blakeway Panoramas, Ideum, and Virtual Grounds Interactive all proved to be fast and creative in reimagining their work for small screens. Roto Group and Richard Lewis Media Group, both prior media partners, supported the project by making their work available for transition to mobile delivery. Having undertaken so many new exhibit projects over the past few years gave us the

advantage of having up-to-date programs and current relationships with these partners. These factors helped the project move efficiently.

As the site design and content were coming together, the chief technology officer explored how to connect guests with these experiences. Web addresses are difficult to remember and type. Phone companies have created better-integrated QR code readers in recent years, but we had aesthetic reservations and concerns about guests' willingness to adopt them.

A member of our board of trustees introduced us to Digimarc, a technology platform that provides direct links to digital content through imperceptible digital barcodes that it places on images. The technology offers a reliable and versatile scanning solution in a beautiful package tailored to each experience. Introducing a new design language gave us a chance to set expectations with our guests that a high-quality experience was available if they snapped a Digimarc image in the museum (fig. 3). We placed the Digimarc images at interactive points; guests snap a photo, and the related CMC In Hand content loads on their device.

Since the Digimarc technology relies on an app download, we considered where we could introduce it to guests. We decided to feature it in a popup on our website that highlights what guests can anticipate when they visit, provide a link to it in ticket confirmation emails, and display signs in the ticketing area with tips about connecting to our building Wi-Fi. We branded COVID-related messaging in a bright orange throughout Union Terminal,

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CMC In-Hand Interactives are powered by Digimarc.

DIGIMARC

CMC
In-Hand Interactives

Fig. 3.

Digimarc graphics featured beloved collections objects within a bold orange frame, an indicator for COVID modifications throughout CMC.

and our designer developed attractive screens and signs that merged the COVID orange with Digimarc embedded pictures of CMC’s most beloved objects – highlighting the familiar in a fresh way. As CMC prepared to reopen in July 2020, we also promoted CMC In Hand in press releases and media interviews.

We also tested, tested, and tested. We borrowed phones, resurrected old models, and generally tried to turn up any weak points. We improved navigation within CMC In Hand and added a building map. Few of us had access to the building to test on-site, which was a limiting factor. Under different circumstances, we would have prototyped an experience such as this with guests. We missed their voices in the process and knew we would want to listen closely to them once they had a chance to use it. We built a post-visit survey that included questions about the CMC In Hand experience to obtain feedback.

Welcome Back! And Let Us Know What You Think

When we first reopened in July 2020, visitation was limited to staff, volunteers, and members. Of this initial group, 37 percent of survey respondents reported accessing CMC In Hand ([intro image](#)), and 83 percent rated the experience seven or higher on a 10-point scale. We learned that phones weren’t picking up some of the image links, so we reprinted those at a higher resolution. Others reported that they needed help with it but appreciated it once they got the hang of it. “[The app] was challenging at first, but your staff...was so very helpful and patient in assisting me. I used it throughout the exhibit, and it was great.” We talked with floor staff and learned what they thought would make CMC In Hand easier to use. In response, we added more information about Wi-Fi and instructions for use, adjusted sound levels in some galleries, and provided more staff training to help them support guests.

At the time of writing this article, four months after we reopened, we continue to add new exhibits to the CMC In Hand app and refine our messaging to support guest interactions. Since reopening, 62 percent of our guests have rated the app seven or higher on a 10-point scale.

This challenge – quickly and affordably making touch interactives accessible to visitors in a no-touch way – revealed that reuse is a valid and useful solution.

Why the slight reduction in ratings? Members and staff families may have more overall enthusiasm, and excited first return visits after our COVID-closure may have affected early ratings. We also still have some work to do; guest survey feedback suggests that the CMC In Hand content is interesting to them but that the interface doesn't always respond as they would expect. "If it went to sleep, the audio stopped, and we could not get it to start without starting at the beginning.... Once these issues are corrected, it will be a great addition."

Other survey respondents noted that sharing the app with a family was a challenge. "With 4 children, the 'hands off' digital app just wasn't feasible...anytime we wanted to try it, we had to rearrange holding hands with older siblings, dig through my backpack, etc. It was just too much of a hassle. Bring back buttons!" Those leaving positive scores are less detailed in their feedback but

appreciative: "We liked the new handheld Digimarc app." "The new app was again a demonstration of that commitment to interactive learning."

Team Reflections

One measure of success is that we had CMC In Hand up and running when we reopened, overcoming earlier apprehension and lack of clarity about producing an app. Surveying guests and quickly responding to feedback is a strong point of this project we would encourage others to replicate.

Our multi-department work team was one of the strengths in development and perhaps one of the challenges for ongoing refinements. Now that we are open to the public, we have new tasks to tackle. Our weekly work team meetings have shifted to an as-needed basis. Many of us continue to work remotely and don't have opportunities for casual check-ins that might occur in our shared workspaces. We are catching and quickly addressing matters that need urgent attention, but refinements can take some time.

An unexpected opportunity presented by CMC In Hand is to invite pre- and post-visit engagement. One guest survey noted, "It would be interesting to read [this content] BEFORE or AFTER seeing the exhibit." We're now incorporating links to CMC In Hand experiences on our website. We're also incorporating CMC In Hand exhibits into distance-learning programs.

One of the reasons we had put off investing in an app was the amount of new content we thought we would need to generate. This challenge – quickly and affordably

making touch interactives accessible to visitors in a no-touch way – revealed that reuse is a valid and useful solution. It enhances accessibility and customization and provides greater access. We are confident that CMC In Hand will continue to enhance the guest experience after it is safe for guests to resume touching exhibits.

The Future is Bright – and Adaptable!

As we develop new exhibits, we are building in adaptability. In addition to adding content to the CMC In Hand app, we are testing gesture-based interactives and touch-free infrared buttons. Our learning team is producing virtual field trips featuring interactives initially converted online for the CMC In Hand app. Though we hope for a return to full engagement, we recognize that we may remain a touch-free facility for some time. We continue to follow no-touch guidance from our medical advisors, who report that while touch is of less concern than initially thought, it isn't a no-risk prospect. Fortunately, we've learned that touch-free needn't mean interactive-free and building the CMC In Hand app has given us new skills and ideas that we'll carry forward into a post-COVID world. ■

¹ “Demographics of Mobile Device Ownership and Adoption in the United States,” Pew Research Center: Internet & Technology, June 12, 2019, www.pewresearch.org/internet/fact-sheet/mobile/#:~:text=The%20vast%20majority%20of%20Americans,range%20of%20other%20information%20devices.

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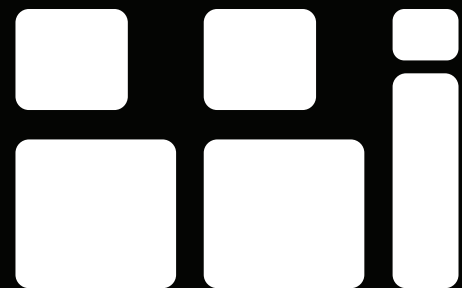
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