

Cruise Mobile Apps

2020 Annual Report

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Introduction

2020 is the second year Sourcetoast has published this Cruise App Report. While many of the same conventions, methods, and analyses were used in 2019, the effects of COVID-19 on the cruise industry have radically altered the way this report should be interpreted.

This report was started in January of 2020 and originally scheduled to be released in late March. The change of direction that most cruise technology departments and companies have taken made much of what we had written seem insignificant. However, after four months there appears to be some limited signs of operations restarting. In light of this watershed moment, we have decided to release this version of the report as the pre-Coronavirus benchmark.

Since the first announcements of sailings being canceled on March 12th, development teams have been working to support the changing needs of operations. As a result, we anticipate large feature releases from all major cruise lines in the next few months. App development will likely prioritize more health and safety features, contactless options, and crowd control systems.

Scope

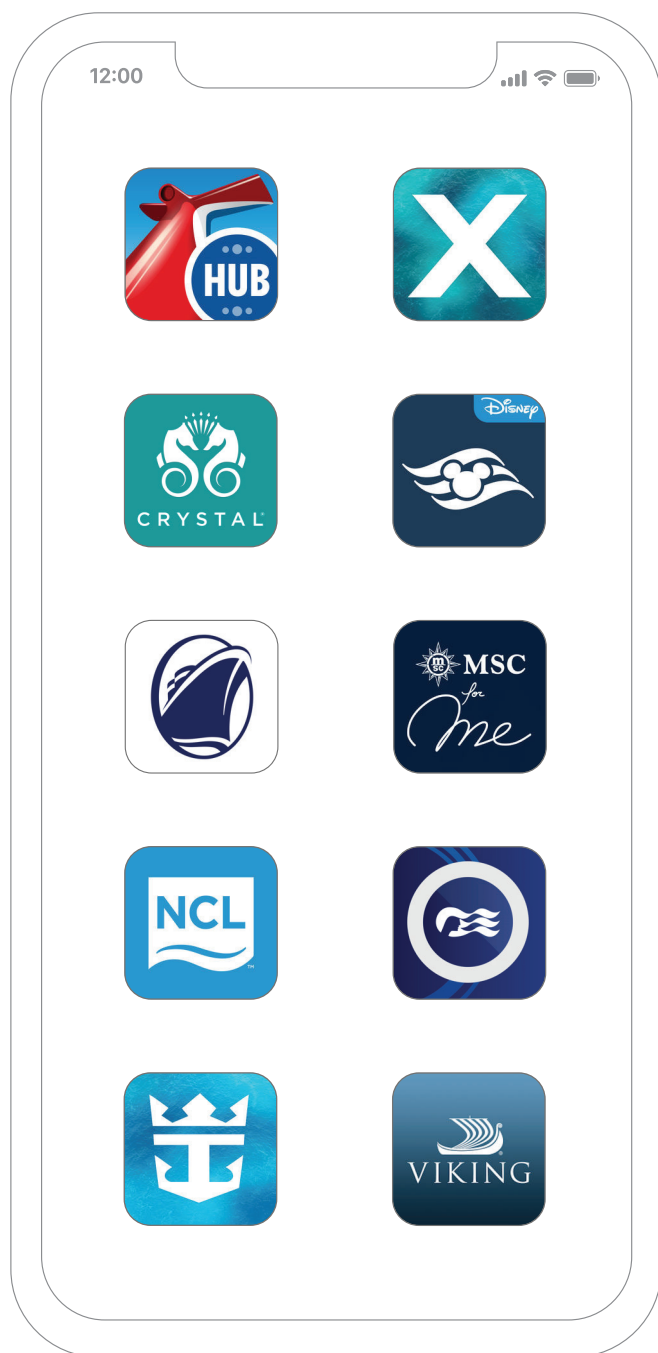
The apps we chose to research for the purposes of this paper met the following criteria:

- » They are designed to be the primary guest-facing app that passengers use while onboard.
- » They work on at least two ocean ships in a fleet.
- » They are downloadable mobile apps and are not web-based.
- » They are not crew apps, brochure apps, entertainment apps, or supplemental mobile applications.
- » They are available primarily in English.
- » They were released and tested before March 12th, 2020.

Methodology

The data and information in this paper were collected from a number of sources, including app analyses from VirusTotal, discussions with professionals in the cruise industry, first-hand experience, articles, online reviews, and demonstration videos.

Mobile Applications



Carnival Cruise Line

Carnival HUB was released in January 2015 and works across the cruise line's entire fleet.

Celebrity Cruises

Celebrity Cruises was released in November 2017. Over the last year, the app was added to two more ships and now works on six ships in their fleet (Constellation, Edge, Equinox, Millenium, Reflection, and Summit), with features varying by ship. This app appears to share much of the same code base as the Royal Caribbean International app, which is to be expected as the brands share an IT department.

Crystal Cruises

Crystal Cruises was released in November 2019 and works on the Serenity and Symphony (the Esprit uses a separate app). There is no Android version of the app at this time.

Disney Cruise Line

Disney Cruise Line Navigator has been around since August 2013, but it was redesigned in February 2018. It works across all four of Disney's ships.

Holland America

In February 2019 Holland America Line released a downloadable mobile version of their Navigator web app. **Holland America Line Navigator** works across the cruise line's entire fleet.

MSC

MSC for Me works on four ships in MSC’s fleet (Meraviglia, Seaside, Splendida, and Seaview). The app went live in June 2017.

Norwegian Cruise Line

Cruise Norwegian was released in October 2017 and now works on all ships in the fleet.

Princess

The MedallionClass experience is currently on six ships from Princess Cruises (Caribbean, Crown, Regal, Royal, Ruby, and Sky). The line plans to make it available on more ships over time.

Royal Caribbean International

Royal Caribbean International became available for download in November 2017, and now works on 21 ships in the fleet (Quantum, Anthem, Ovation, Spectrum, Harmony, Oasis, Symphony, Allure, Wonder, Independence, Liberty, Voyager, Navigator, Mariner, Adventure, Brilliance, Serenade, Radiance, Enchantment, Vision, Rhapsody, Majesty, and Empress). As mentioned before, this app shares much of the same code base as the Celebrity Cruises app, which is to be expected as the lines share an IT department.

Viking Ocean Cruises

Viking Voyager was released in June 2017 and works across the cruise line’s entire ocean fleet (Star, Sea, Sky, Sun, Orion, and Jupiter).



Availability

The infographic below shows how many ships across each cruise line’s fleet support a mobile app.



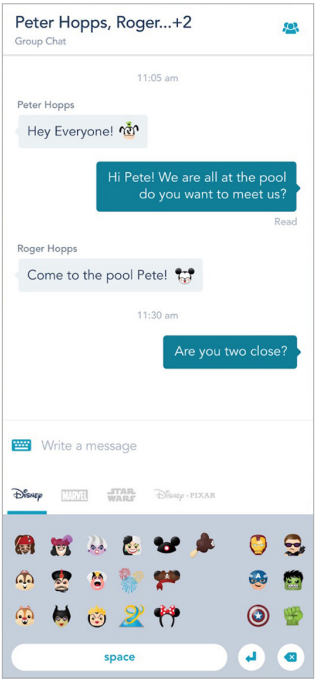
 Supports mobile app onboard  Does not support mobile app onboard

Features

Each app that we analyzed contained a fairly broad selection of features and options. To better compare and contrast the applications’ offerings, we broke down their features into three categories: common (almost standard), unusual (appearing in at least two apps), and unique (differentiating, or found in only one app). This year, we saw more features moving from unusual to common and an increase in unique features.

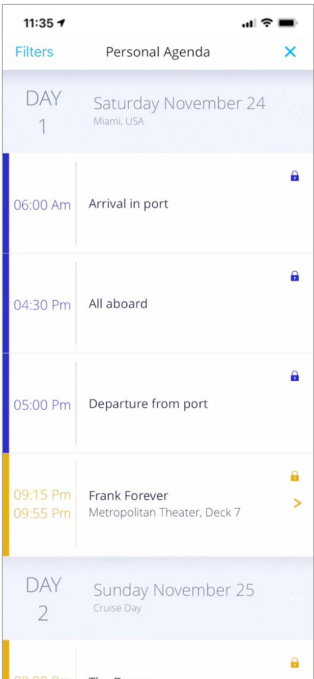
Common Features

There are several features shared by the majority of the apps we reviewed.



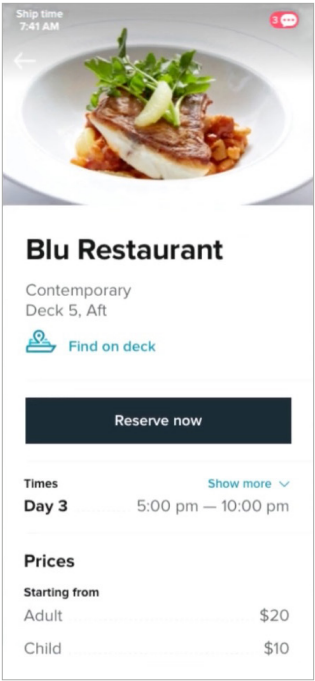
Chat

Chat has now been adopted by the majority of the apps we reviewed. Although a couple of cruise lines still charge small fees, it is increasingly becoming a free feature.



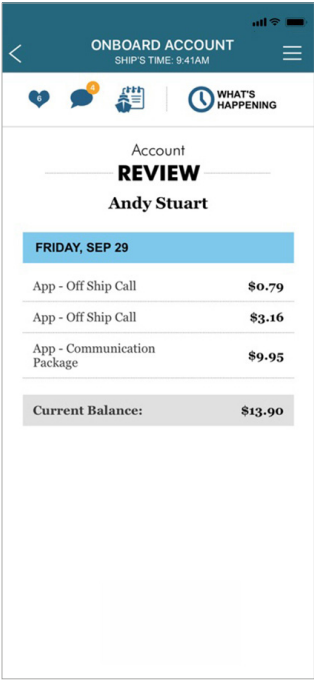
Daily Schedule

The daily schedule is the main stop when planning your activities for each day. You can usually add, book, or mark an event, which then moves to your personal calendar.



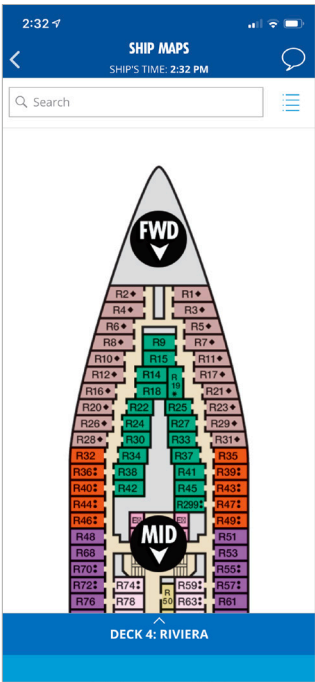
Dining

Every app has at least some information on dining options. Dining features across applications include hours, menus, images, locations, dress attire, reservations, and reservation cancellation.



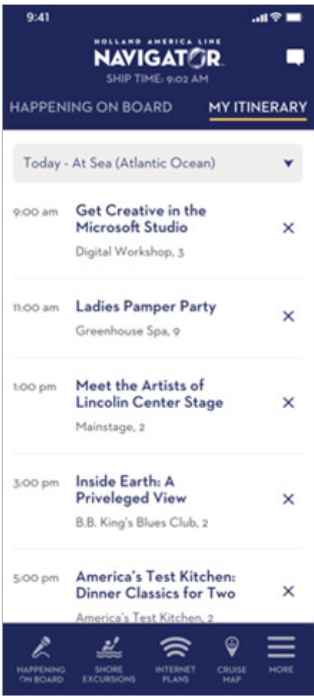
Folio

The folio is an itemized billing statement that updates when you make purchases. This feature is important for avoiding bill shock at the end of a cruise.



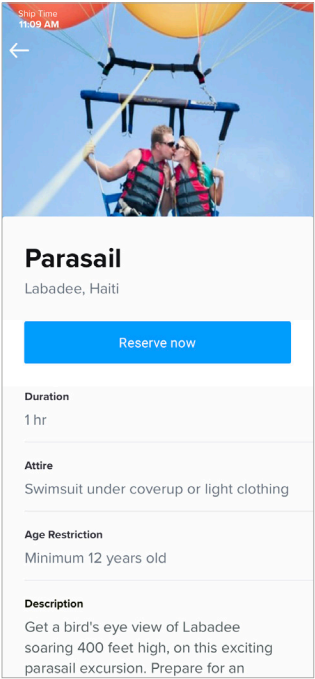
Map

Deck plans are a ubiquitous feature and a critical guide for guests who are navigating their way around the ships.



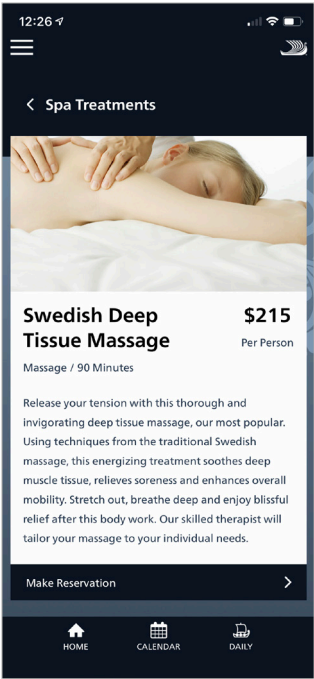
Personal Calendar

The personal calendar is your customized schedule. Once you have chosen or booked an activity, it appears on this calendar.



Shore Excursions

Almost all of the mobile applications we reviewed allow you to both research and book an excursion.



Spa Services

Most cruise lines have some kind of spa service. On most of these apps you can view the offerings, and on a few you can make your reservation.

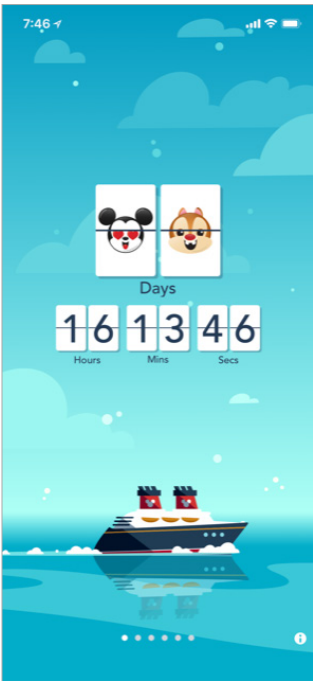


Weather

Having the current weather and the weather forecast available is a useful feature, especially if you are planning a shore excursion or deciding on your activities for the day.

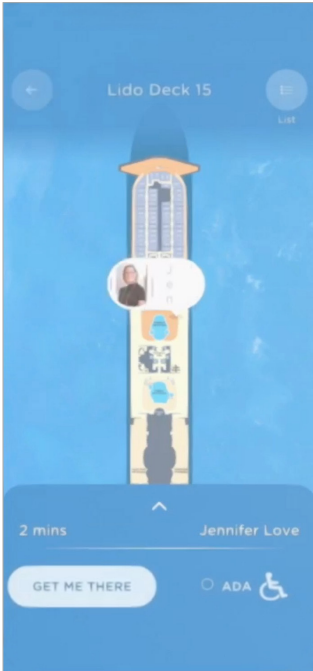
Unusual Features

The following features were shared by at least two of the apps we researched, indicating that we may see more apps adopting them in the next couple of years.



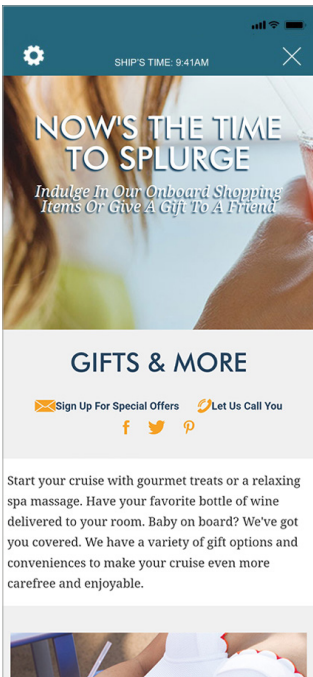
Countdown Clock

A pre-cruise countdown that works before you board the ship is being introduced to more apps. This feature helps to build anticipation for a guest’s upcoming cruise.



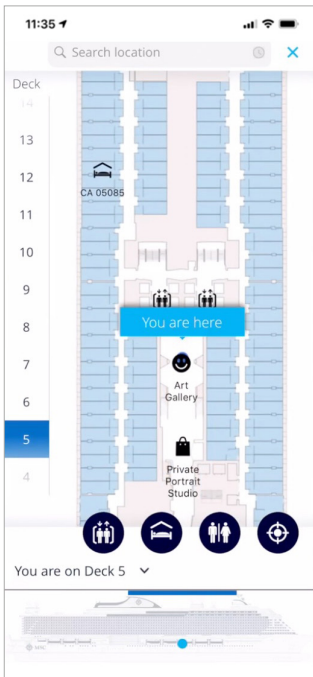
Passenger Locator

Wayfinding and wearables are making it possible to keep track of your family and friends.



Purchase Merchandise

Apps are beginning to offer more options for purchases, including gifts before you even board the ship.

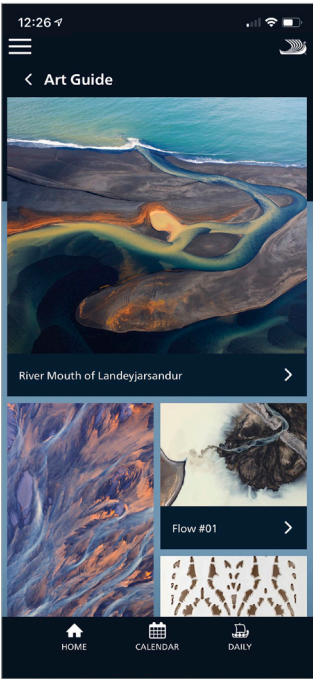


Wayfinding

A couple of the apps we reviewed are now using a Bluetooth Low Energy (BLE) beacon system to help guests find their way around the ship.

Stand-Out Features

Below are some of the unique features that stood out to us.



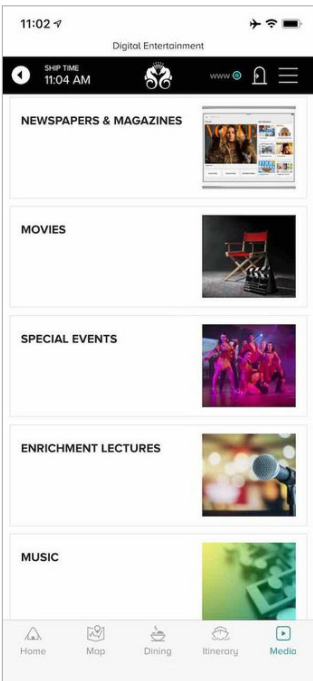
Art Guide

Viking Voyager, Viking Cruises’ primary guest-facing app, includes the Viking Art Guide. Guests can listen to audio clips about historical pieces, works of art, and different areas of the ships. This feature is available to any Viking guest.



Cruise Map

With the Holland America Line Navigator Cruise Map feature, guests can see where all Holland America ships currently are, including their own.



Digital Entertainment

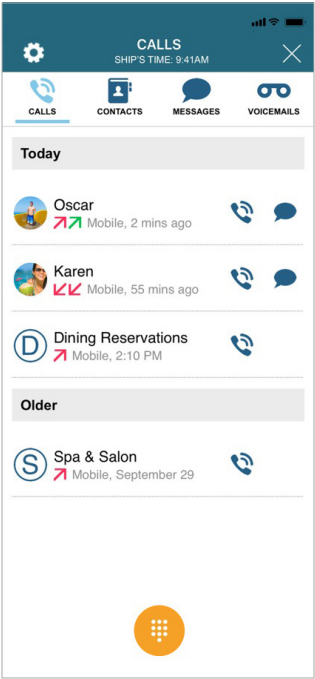
Crystal’s new app contains a full digital entertainment suite that includes movies, music, enrichment lectures.*

*Both Crystal and Princess offer their own channel and shows via the apps.



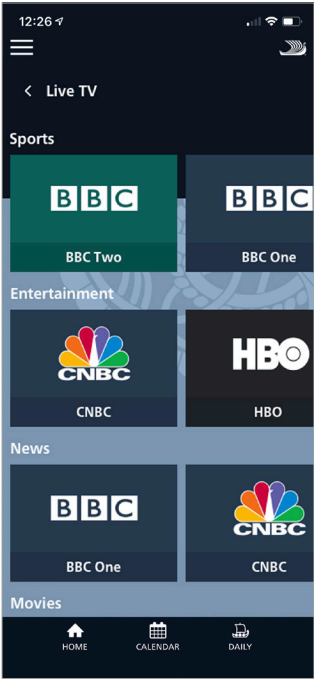
Geolocated Orders

MedallionClass allows guests to order drinks or merchandise from the app. The order is sent to the closest bar or store location. Bartenders and servers in the area then deliver the order directly to the guest.



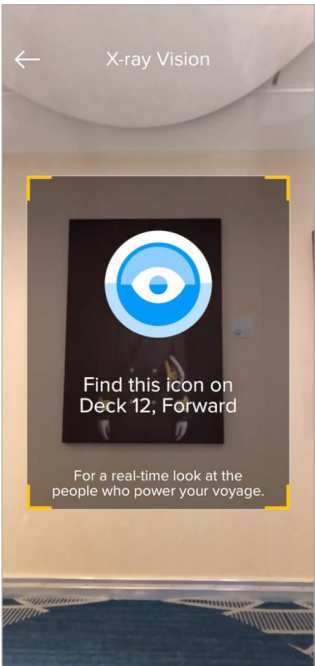
Guest Calling

Along with a chat system, Cruise Norwegian also has a call feature that allows guests to make unlimited calls to other guests for a small, one-time fee of \$9.95 (USD). Guests can also use it to call home for \$0.79 a minute.



Live Television

Another complimentary feature on the Viking Voyager app is live television. The app works anywhere on the ship, allowing guests to sit by the pool and watch the news on their phones or tablets.



X-Ray Vision

Royal Caribbean International has incorporated an AR-like experience into their primary guest-facing apps. With Royal Caribbean International and Celebrity Cruises, you can use the X-ray Vision feature to virtually look through the walls to explore areas of the ship not usually accessible, like galleys and the bridge. Although this just connects to a live video feed, it is a unique and entertaining feature.

Tools and Key Players

ProGuard

ProGuard works like many obfuscation tools by optimizing the Java bytecode. This tool is joined by many on both Android and iOS for the purpose of optimization and security protections at the application level. The benefit being that any prying eyes have a lot more work to do instead of looking at bytecode equivalents of the protected source code of each application.

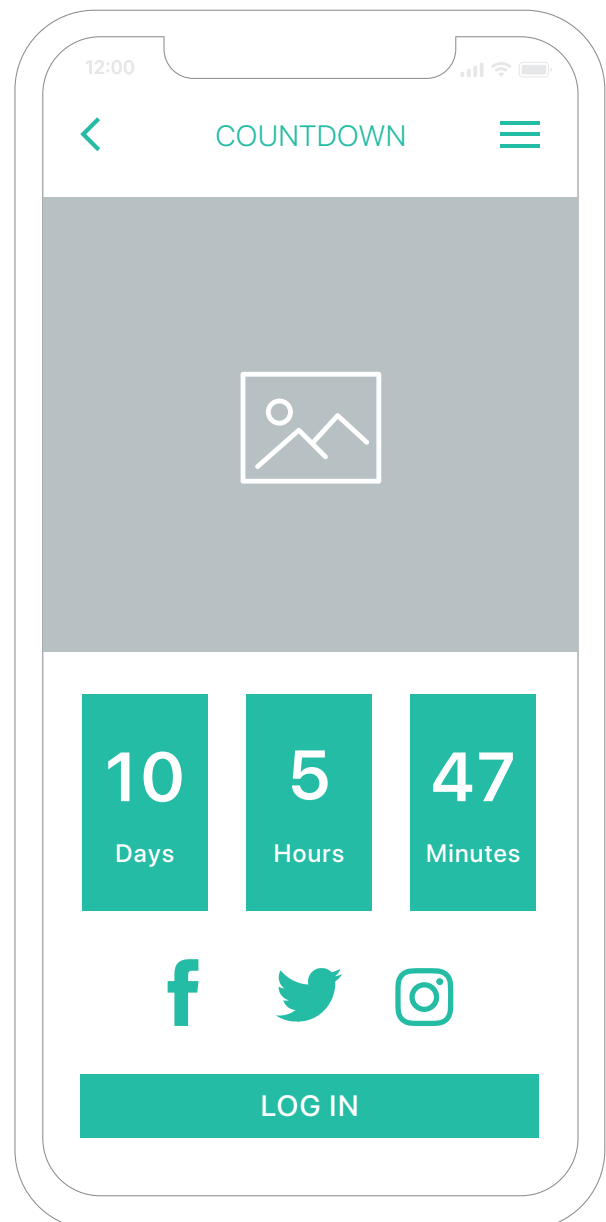
Charles

A common challenge while developing mobile applications for cruise lines is the debugging of issues discovered. No amount of logging and exception logging is the same as a developer being on the ship and experiencing the issue firsthand. Replicating the same issue locally might be difficult due to a variety of services not available in a test environment. Charles works by allowing you to proxy onto the ship to test the issue directly on a real device. We discovered a number of applications that contain a Charles SSL certificate, hinting towards multiple cruise lines using this type of debugging.

External Settings Files

Cruise applications have an uncommon constraint: they act differently based on the network you have joined. The idea of the application acting differently automatically requires a solution that works without the guest noticing anything. An external settings file works by requesting a file from a specific domain with configuration flags. Once con-

nected to the onboard network, this file will return different flags than it returned when connected to a standard internet connection. This can be expanded greatly to include more than simple configuration flags. We noticed this pattern of development in many of the applications.



Developers

Analyzing the apps provided insight into the development teams behind the code. Package names and test account information was often clearly visible; however, it is problematic to make assumptions about developers unless it is quite obvious. Developer vendors can provide external libraries that cruise internal teams ingest into the in-house codebase to add an out-of-the-box feature. External development teams may also be augmenting in-house developers with outside vendors. An exception is Accenture.

Accenture

We discovered several apps in testing that strongly suggested the multibillion-dollar consulting firm's participation in the programming. Accenture has extensively publicized their involvement in the development of the Carnival Medallion project, and it appears to be offering both full application development and the augmentation of in-house teams in the cruise space.

Liferay

Liferay is an open-source enterprise CMS. We found that at least two cruise applications were using some part of Liferay DXP, the company's digital experience platform, most likely to deliver marketing content and images to the app. Liferay is also likely being used as an EFSS (enterprise file synchronization and sharing) tool to coordinate shoreside digital assets for synchronizing to onboard systems.

Cruise Director (Sourcetoad)

Sourcetoad's Cruise Director is a suite of onboard and shoreside software tools designed to manage various aspects of both guest-facing and crew-facing applications.

Cruise Director contains out-of-the-box modules for entertainment (i.e., iTV and music), digital signage, captive portal, mobile app creation, IoT device management, crew rosters, and PMS front ends. Custom modules are easily added to enable interfaces for new technologies, dashboards, or features.

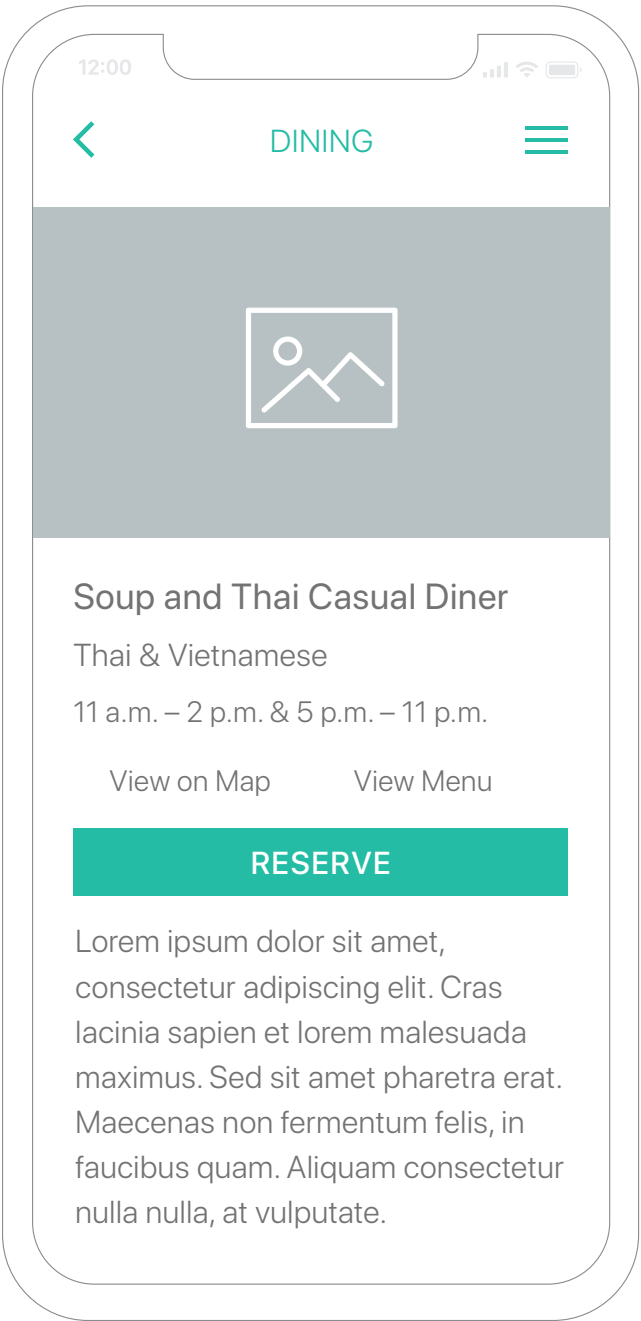
The framework is built on shared API management, shoreside synchronization, content management, and analytics across the suite. This allows all modules to have a cohesive interface, which can be managed from a shoreside office, while sharing data with other modules and funneling data into a combined analytics system.

SIP Providers

A couple of cruise apps currently use a VoIP phone system for making onboard, cabin-to-cabin calls. Some of the applications, however, have a SIP client library (the software required to make VoIP calls) inside of them but do not have a phone feature. When we dug into the possible reasons, we decided it might be to enable push notifications.

If a ship is not connected to the internet, you cannot send push notifications to passengers. One way around this is to have an app that listens in the background for notifications from a local server. Background pushes are useful but are not instant-

neous. In fact, they can take up to an hour in some situations. The potential for long delay defeats the purpose of push notifications, especially if the cruise line wants to alert guests to a whale sighting off the port bow.



The exception is if the app has SIP permissions built into it. Because a VoIP app needs to get messages instantly for incoming call alerts, including a SIP library in the app can enable real-time background push notifications, even if there is no onboard VoIP system. This is risky, however, because Apple has caught apps doing this before and banned them from the App Store. It also has been deprecated by Apple, and is no longer available in later versions of iOS. Instead, Apple requires all VoIP apps to use PushKit (which requires connectivity to Apple’s servers in order to function).

Test Data/Shim

Many of the apps we researched included test, or “shim,” data inside of them. This is basically a text file containing a fake passenger’s details, calendar, folio, and any other items needed for testing. This shim data will also include items such as restaurant menus, available spa treatments, and shore excursion offerings. The reason the data is included in the actual app is so Apple (or other testers) can test the app without connecting to a PMS (property management system) or shoreside test databases. The risk with this data remaining in the application is that it could expose vectors of attack for hackers by providing insight into other onboard operations.

Test Logins

About 50 percent of the apps we investigated contained clear text usernames and easily visible passwords. This might sound more alarming than it actually is, but it is interesting to note. These credentials are for testing purposes, specifically for Apple’s testing. Unlike the Google Play store, which

relies solely on automated tests, Apple has real people try out the apps. Because most cruise apps are designed to only work shipboard, testers need a way to trigger “onboard mode” with fake credentials to log in. Of course, this leaves open the possibility that someone could log into the apps without having to pay for a ticket.

Bug Tracking and Logging

When issues arise, there might be thousands of miles between the developers and the cruise ship. Crashlytics is a tool used by some apps to detect a crash and send all the associated details to a specified location. If no internet is detected, Crashlytics will store that error and upload the crash when internet connectivity is detected. With the large amount of details associated with every error, this is crucial for fixing problems. We noticed multiple applications with the configuration required for utilizing Crashlytics.

New to 2020’s bug tracking systems is Instabug. Instabug is similar to Crashlytics in a number of ways. The company has rocketed to success in the last three years and is one of the fastest-growing SaaS companies in the world.

Card Scanning

Card or passport scanning software is one of the trends for 2020. These applications and libraries are embedded into cruise apps to allow passengers to scan credit cards, driver’s licenses, or passports to speed up the check-in process.

Microblink seems to be the primary choice in embedded card-scanning SDKs. BlinkID and BlinkCard

allow developers to capture ID documents and credit card information from device camera scans.

Card.io libraries have also been seen inside of cruise apps. Card.io allows developers to import credit card information from a device’s camera. This technology is mainly backed by Paypal, but Card.io is an open-source product.

Chat

Passenger-to-passenger chat systems have been making their way slowly into cruise apps for a few years. Chat systems are not particularly complicated, and there are many off-the-shelf solutions that would allow developers to add chat functionality quickly. In fact, we have seen Chatsdk.co (a free mobile chat SDK) being used in more than one app in the space.

Then why has chat been so slowly adopted? We believe that technology is not the problem, but the questions around privacy and management create so many difficult questions that it often forces chat to the back of the priorities queue.

Allowing passengers to have access to chat creates a number of questions, including:

- » How do we allow passengers to communicate with members outside of their cabin mates while maintaining the privacy of other guests?
 - › How should group chats be managed?
 - › How should age verification be handled?
 - › How do you design an invitation system that respects privacy?
- » How should unwanted communication be addressed and managed?

- » Are there liability issues that arise when communication has been logged or can be saved?
- » What level of crew interaction should be allowed over chat systems?
 - › Are there policies in place governing crew’s written communication?
- » Should chat systems continue to work onboard, onshore, and post-cruise?

These questions significantly complicate the more simple act of enabling chat systems. Many of these questions still have not been adequately addressed by the industry, but the inclusion of chat SDKs points to the fact that some lines are prepared to be the first movers. Once standards have been worked out in one brand, other lines will follow quickly.

Artificial Intelligence

Passenger-to-passenger chat systems are not the only emerging text chat tools in cruise apps. Kore.ai, a virtual AI assistant system, has now been seen bundled into applications, and there are indications that at least three other lines are experimenting with virtual chat assistants. These bots are commonplace on the web, but have not taken off in shipboard applications. This is mainly due to the lack of on-premise solutions and data infrastructure. Virtual assistants need to be trained and conversations built on top of readily available data sources and APIs. If the data required to answer questions about the weather tomorrow is in a different system from the one required to make dining reservation inquiries, the development of AI systems becomes prohibitively complex.

Virtual voice assistants like MSC’s Zoe platform were bespoke builds. However, with the increasing sophistication of onboard middleware products, it will become easier and more cost-effective to integrate pre-built AI systems into existing mobile apps.



Beacons and BLE

Bluetooth Low Energy (BLE) beacons allow a Bluetooth-enabled device (such as a smartphone) to detect small radio devices nearby. These devices send out an identifier that the detecting device can send back to a central server to learn more information.

Beacon functionality increased from very little support in 2019 to appearing in at least three cruise apps in 2020. The three current uses of BLE are:

- » Allowing passengers to unlock doors and access gangways.
- » Guiding guests around the ship (i.e., wayfinding).
- » Providing contextual data for the passenger based on location (e.g., showing the title of a piece of art).

The promise of BLE beacons onboard cruise ships has been anticipated for some time. Some of the potential applications include:

- » Creating automated headcount systems for crowd management.
- » Improving mustering procedures by checking in passengers to stations.
- » Allowing F&B staff to find passengers in a bar or pool deck to deliver drinks.
- » Enabling contact tracing after passengers have become ill.
- » Providing crew with relevant data on nearby passengers.
- » Tracking the movement of passengers throughout the ship for design improvements.
- » Sending targeted notifications to passengers based on their location (e.g., pushing spa specials when you are near the spa).

The Android Beacon Library was found to be particularly common in a number of apps. This combined with the increase in BLE libraries indicates that cruise lines are making significant investments in the infrastructure to enable these technologies onboard.

New Technology Blends

In 2019, almost all apps analyzed were predominantly native, meaning they were written in Java or Kotlin for Android platforms and Objective-C or Swift for iOS platforms. There was one exception to this, using React Native. In 2020, two alternative technologies joined the industry, Cordova and Unity.

Unity was primarily developed to be a hybrid 3D gaming engine. There have been a number of non-gaming mobile apps built with Unity, but it is still an outlier as far as development choices go. The Unity engine does allow for more radical interface designs, as well as a single code base to be deployed across iOS and Android devices.

Cordova is another cross-platform technology, which essentially allows developers to write code using standard web development tools (i.e., HTML5 and JavaScript) and then run that code in an app wrapper. This is similar to most interactive TV development in that the application runs a headless browser and then loads the web content into the frame. This is another unusual choice for a cruise app. Development time and complexity are significantly lowered, with the tradeoff coming in terms of speed and functionality.

AssaAbloy

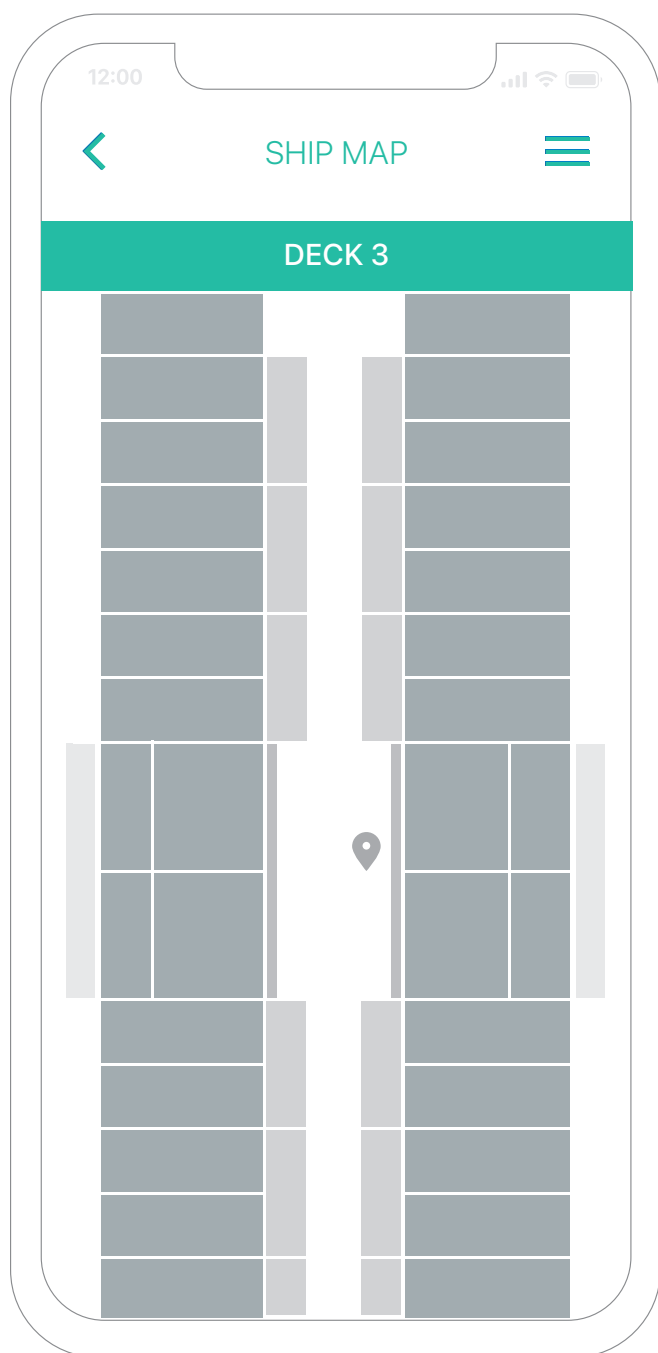
AssaAbloy Global Solutions Marine (formerly VingCard) is by far the leading provider of cabin door lock systems in the cruise industry. Mentions of their libraries have been spotted in a number of

cruise apps in the past, but full implementation has seemed elusive. Two mobile apps have now been seen to include the full SDKs, although it is difficult to know the full level of integration. These SDKs would allow a passenger to use their phone to access the gangway and unlock their cabin door.

Even though the technology to enable these convenient lock systems is available on many ships, it has yet to be widely rolled out. This may be due to several factors:

- » The certifications required to work with the SDKs involve in-person training, often in Northern Europe.
- » Integration requires a fairly robust understanding of security systems and may be more challenging than standard mobile app development.
- » Gangway systems and door lock systems may be from different suppliers. This means that generating a soft key may enable a passenger to unlock their door, but not access the ship. Having a passenger carry a keycard and a phone defeats the purpose. Integration with two separate systems also dramatically increases development complexity.
- » Card printing systems may be run through separate integrations with the PMS, creating issues for developers who would have to manage both access control and card printing at the same time (rather than simply rolling out a soft key option).

The reemergence of the AssaAbloy SDKs in Android binaries strongly hints that this will soon change.



Rating Our Predictions From 2019

More “Offline” Features

In 2019, we predicted that more offline features such as map tiles, guidebooks, and language packs would be added to cruise apps. Although there was an increase, it was not as significant as expected.

Score: 6/10

More Shoreside Content

Last year we predicted a significant increase in the amount of content available pre-departure. This could include anything from virtual ship tours to educational videos to full BND booking systems for on-board activities. At least two of the cruise lines have drastically increased their shoreside features, and it is clear from our inspections that three more have similar features in the works.

Score: 8/10

Guest Loyalty

We predicted that post-cruise uses for apps would include surveys, enhanced content, and marketing messaging. This has turned out to be low on the priority list of cruise lines over the last year. There are signs that this development is still being worked on. A number of apps we inspected have specific subsystems for knowing when a cruise is over and pushing notifications and content to former passengers. This may once again be put on the back burner for next year at least.

Score 3/10

Augmented and Virtual Reality

AR and VR systems are still fairly unusual in cruise apps. In hindsight, our prediction should have focused more on these technologies by the targeted demographic. Although there was one new instance of a brand catering to an older audience using a VR experience, it stands to reason that these technologies would be more at home with a younger passenger base. These systems are being added to applications in the form of virtual ship tours, augmented reality features on walls, and digital signage interactions.

Score: 5/10

Social

We predicted a large increase in the number of apps with chat and messaging features. While some of the more speculative predictions (e.g., finding chess partners, meeting people with similar interests, etc.) have not come to pass, the amount of social features has been one of the largest, industry-wide developments.

Score: 9/10

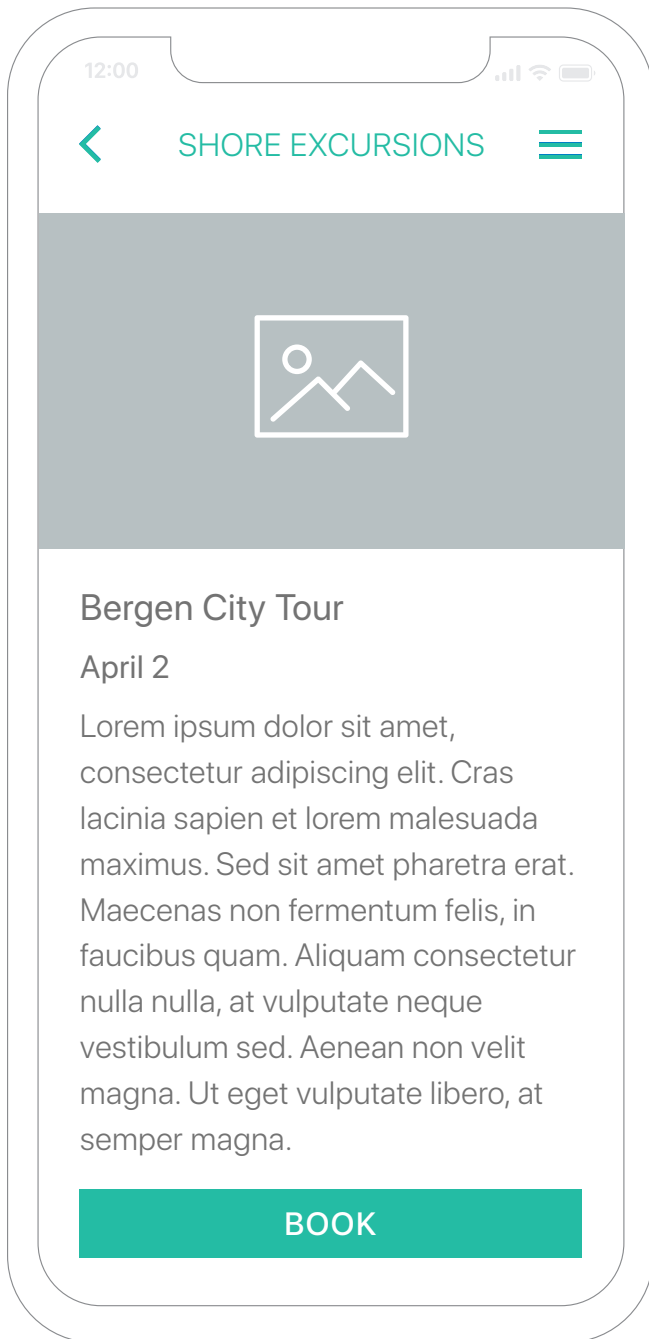
Environmental and Sustainability Features

While some movement has been made on features such as digital newspapers and reducing paper waste for daily newsletters, most of our predictions have not come to pass. However, many of the health and safety predictions made in 2019 may now be pushed to the forefront of development due to COVID-19 pressures.

Score: 3/10

Looking Ahead

There is an increasing number of unique or stand-out features, and we have identified a few emerging trends among the various brand categories.



Health and Safety

COVID-19 is clearly going to be the largest driving factor in mobile app changes for the cruise world for the foreseeable future. These changes are likely to be seen in a number of categories, depending on the direction each cruise line decides:

- » Communication: Reminders and notifications about what passengers need to bring, instructions on how they need to wear masks, and highlights of best practices for physical distancing.
- » Behavioral changes: Incentives inside of mobile apps for passengers to enact certain safety precautions. This may be as simple as offering loyalty points or discounts for filling out a health survey to more complex gamification incentives for behaviors such as using handwashing stations.
- » Operational safety:
 - › Increasing physical distancing can be encouraged by using better crowd management technology throughout a voyage for limiting group sizes and staggering usage of bottlenecked areas.
 - › Linking medical, menu, and supply chain systems will also open up opportunities for rapid operational responses.
 - › Beacons and access points can track an individual's device through the ship, allowing operational and medical staff to locate a guest who is ill, and potentially notifying those with whom they have been in contact.

Sustainability

Reducing reusable paper onboard will be a step toward surface hygiene, but also toward more environmentally friendly practices. Paperless receipts are an option on many cruises already, but there will be an increase in paperless daily newsletters, activity announcements, waivers, food and beverage menus, tent cards, and stateroom compendiums. Messaging on digital displays, interactive TVs, and apps running on personal mobile devices could soon become the main method of conveying this information. Paperless menus, in particular, could soon become ubiquitous. The reduction of paper onboard will also significantly reduce operating costs and staff time.

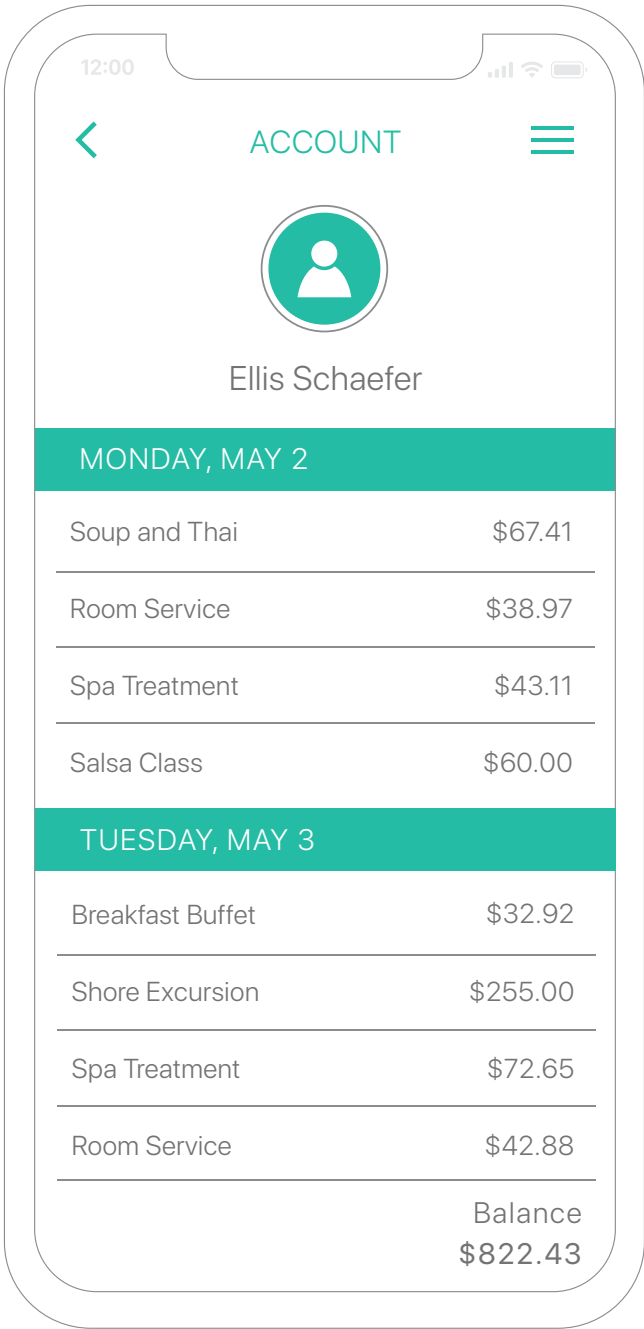
AI and Virtual Reception

We see a large amount of potential for the addition of virtual and AI assistants in future cruise app releases. Providing users with the ability to text or talk to a bot for basic needs could significantly reduce the burden on human staff. These assistants are more likely to take the form of chat tools inside of mobile apps than an actual in-cabin device that a passenger can interact with – like an Amazon Alexa or an Apple Homepod.

Cabin Automation

Climate controls, virtual remote controls, touchless door locks, and automated blinds and curtains are all technologies that have already been seen in some form or another on various cruise lines. As these technologies become easier to implement and the control systems become more cost-effective, we predict these features will gain a broader adoption.

Many of these changes may be driven by health and safety concerns; reducing a passenger’s exposure to public surfaces and devices other than their own can help lower the risk of infection.



Conclusion

The future of the entire cruise industry is uncertain at the moment, but very few large industries are as well-positioned to invent their way out of a crisis. Technological innovation has been strongly embraced as a competitive advantage in the cruise world. The challenges created by the COVID-19 pandemic are likely to inspire a unique ecosystem of ideas and ignite a new round of feature races.

Looking at the pre-COVID development trends, we can see a number of features that were becoming industry standards. Interactive shoreside content has quickly become a standard throughout the industry. There is a lot of room in this space to grow, but a simple cruise countdown screen is soon going to be below passenger expectations. Social features, mainly shipboard for now, have also become must-haves for most of the large, family-orientated brands. Expect these features to move to more niche lines and to extend shoreside offerings in the near future.

Patterns in new technological advancements and cutting edge features are also emerging. Card scanning, chat systems, and AI or decision engine systems for passengers are the most likely contenders for becoming ubiquitous over the next few years. A more diverse set of development tools and platforms are also being seen in production, with React Native appearing to be the next likely competitor to the widely adopted native platforms.

The pandemic will delay all but the most agile development teams from implementing features that were priorities in the pre-COVID world. An app development team working on BLE cabin door locks will almost certainly have been redirected to work on health questionnaires or paperless daily newsletters.

The next version of this report will be released after at least half of all cruise lines have recommenced sailings. The obvious speculation is that much of the development being done during the pandemic will focus on health and safety features, including health messaging, contact tracing, and reporting tools. More shoreside features are likely to be seen as well, while marketing and digital departments search for ways to keep customers engaged with their brands, even while ships sit empty.

Pre-pandemic app development has largely been a race to implement features to meet passenger expectations. This has meant a race to provide the broadest range of functionality within a fairly well understood set of industry constraints. COVID-19 has very likely turned that paradigm on its head. During the pandemic, each cruise line will proceed with their development inside a vacuum until sailings resume and competitive analysis can be performed. This means an exciting time for innovative ideas, features, and divergence of strategies. The cruise mobile app space should be extremely interesting to watch over the next six to eight months.

About the Author

Sourcetoad is an award-winning enterprise application development firm specializing in cruise industry solutions.

Sourcetoad's mission is to solve complex operational problems and bring convenience and delight to guests.

Sourcetoad is based in Tampa, FL and Perth, Australia.