

eGOVERNMENT MOBILE APPS STANDARDS 2016-2017



KINGDOM OF BAHRAIN
Information & eGovernment
Authority



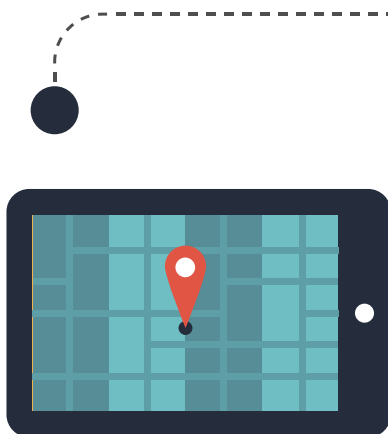
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INTRODUCTION

The implementation of the National eGovernment Strategy 2016 is well underway with the continuous aim of transforming government service usage from physical to electronic channels by creating an eGovernment portal, mobile applications, kiosks, Through which the Authority seeks to promote and strengthen user participation. Bahrain's Information & eGovernment Authority (iGA) strives to facilitate mServices (mobile services) to citizens, businesses and other governmental entities.

Implementing the eGovernment's Strategic Transformation Towards Smart Devices involves the utilization of all kinds of wireless and mobile technology, services, applications and devices created to benefit citizens, businesses and governmental entities which utilize the electronic services (eServices).

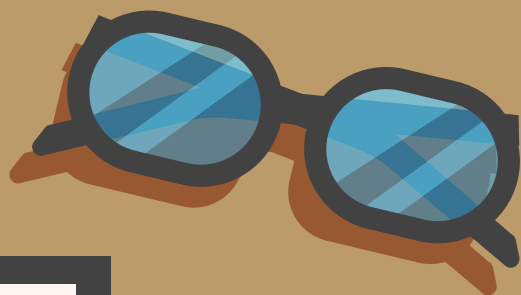




PURPOSE OF THE STANDARDS

The Mobile Standards is one of the main components of the “eGovernment’s Strategic Transformation Towards Smart Devices” which were approved by Supreme Committee for Information and Communication Technology (SCICT). These standards are important as it ensures that an optimal, consistent user-experience is delivered across the Kingdom’s government mobile apps. The standards outlined in this document intend to further **help drive a structured approach to consistently develop high-quality mobile apps** that are incorporated in Bahrain’s mGovernment (mobile government) App Store. The standards are focused on placing users at the center of the application design in order to ease their usage of the services on mobile devices in simple, pleasant ways.

***Note:** Developers may refer to the Apple guide or the Google Play UI guide to follow each platform specific guidelines given that such guides do not conflict with the guidelines outlined in the standards.*



DEFINITION of mSERVICES

mServices (mobile services) are an extension of electronic services - to enable the public utilizing government services at any time anywhere while using smart devices such as mobiles, laptops, personal digital assistance (PDA)s, etc.

The mServices are divided into four main categories:

- **Information Services**

The type of services which users can access government information, request data, register and generate reports. Usually, such services are static and does not require voluminous interactions between users and government entities. For example: government rules, regulations and inquiries, live traffic information, public events inquiry, prayer timings, etc.

- **Interactive Services**

Usually requires interaction between the users and governmental entities by requesting specific data and accessing certain information which require user identification and authentication. For instance: students exam results, issuance of ID card and status inquiry, Commercial Registration and inquiry, in addition to communicating urgent cases, etc.

- **Transaction Services**

Mainly involve the exchange of payment in return of a service. Such services are usually available 24/7 with significant security and privacy measures. Such services require specialized platforms to be integrated such as the National Payment Aggregator (NPA) to ensure secured transactions and information storage. Examples of these services are: Pay Electricity and Water Bill, Payment of Criminal Orders as well as Commercial Registration Services.

- **Integrated Services**

These types of services require data collection from multiple departments and governmental entities, in order to enhance service performance and efficiency. For instance, the approval of certain business activities needs to be taken from various governmental entities such as the General Directorate of Civil Defense, Ministry of Health along with Ministry of Works, Municipalities Affairs and Urban Planning. These types of services usually provide the most value to the public.

mSERVICES vs. eSERVICES

Understanding the difference between the mServices and eServices is essential to consider the suitable and relevant kinds of services.

The types of services that can be considered as mServices to benefit the public include:

- Transforming into mServices from suitable existing eServices which are conventional web-based services that can be made available on mobile devices.
- Citizen-based mobile services: These are unique mServices that are not available as eServices but became possible as a result of mobile technology. For instance, using Near-Field-Communication (NFC) payment for public parking lots and paying highway tariffs. Such as 'Salik' in Dubai.
- Government employees' mServices: These types of services enable government employees to perform tasks while out of their office; such as reading electricity meters, performing inspection services and emergency services, etc.

mSERVICE'S CONCEPT CLARIFICATION

When deciding upon which service to be delivered as an mService or eService, the below clarifications should be taken into account:

- mServices enhance and complement eServices, not replace them.
- mServices can also be provided on tablets and other smart devices, not only on mobile phones.
- mServices essentially have two main objectives which are to improve public service usability and accessibility; as well as enhance and smoothen government processes and interaction amongst entities.



KINGDOM OF BAHRAIN

mGOVERNMENT

APPS STORE

The Kingdom of Bahrain's mGovernment App Store was created to encourage both private and public sectors to collaborate in developing mobile apps that will serve Bahraini citizens, residents and other constituents. An illustrative view of the envisioned mGovernment App Store ecosystem is provided below in (Exhibit 01).

There are three primary stakeholders within the ecosystem that contribute to its success:

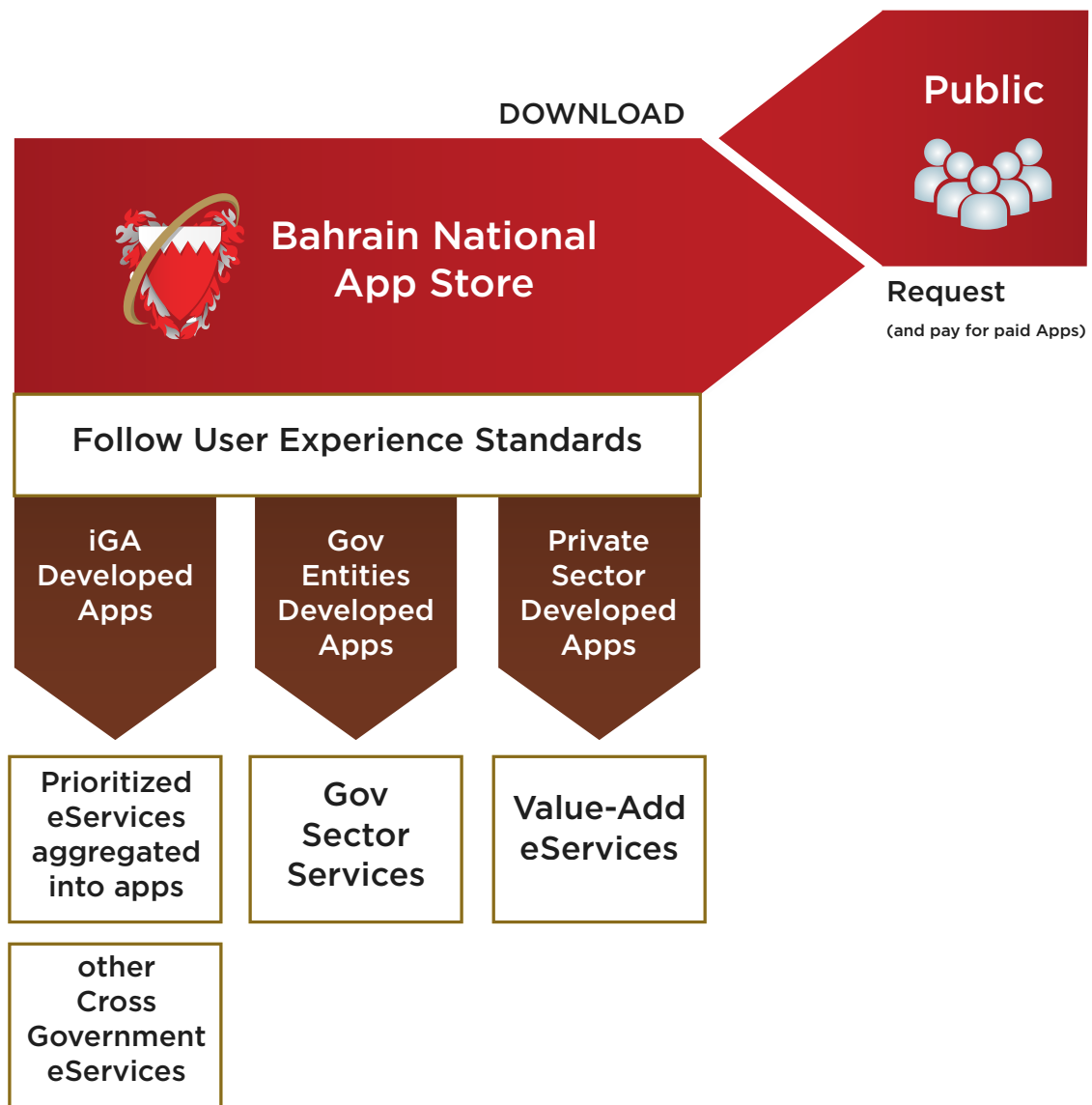
- The **Information & eGovernment Authority** which develops mobile apps for core cross-government services develops and enforces a quality control process for all mobile apps prior to adding them to the mGovernment App Store.
- **Governmental entities or institutes** that work with private sector mobile application developers to develop mobile apps - specific to their line of business (for instance; education, healthcare, etc.) - provide value-added services.
- **Private sector entities or individual developers** who leverage available open data that are provided by Bahrain's governmental entities and develop value-added service applications.

Bahrain's mGovernment App Store, at the center of this ecosystem, is a catalogue of the country's government and value-added mobile apps. It serves as a directory of organized or classified mobile apps that are easily searchable and downloadable. The catalogue is open to the public and primarily targets residents, citizens, businesses and visitors of Bahrain.

While government-developed apps are to be provided free-of-charge, private sector contributors and individual developers may elect to charge a fee for download at the sole discretion of the mobile app developer. The app store will also be available as a standalone mobile application to provide an easily accessible catalogue of all government mobile apps.

The store is governed by a set of mobile application development Standards detailed in Section 2 of this document. Government entities and private sector entities or individual developers are to comply to these Standards if they wish to have their mobile applications available on the store. **All mobile apps to be developed and made available on the store will require undergoing an evaluation process by the iGA following a rigorous quality control process and subsequent approval by iGA.**

Scope of Mobile App Standards



TARGET AUDIENCE

This document is produced by Bahrain's Information & eGovernment Authority and published in accordance with the Kingdom's National eGovernment Strategy 2016. It is intended for internal government entities, designated third party developers or private sector mobile application developers to use as standards in **creating consistent, high-quality mobile applications for the delivery of government and value-added services.**

CUSTOMER SEGMENTATION

Bahrain's Information & eGovernment Authority is focused on enabling the public, government organizations and the private sector with a platform of advanced ICT technology to enhance the way these three entities interact with each other in order to satisfy public requirements in an innovative and interactive manner.

In order for mobile app developers to understand which types of mobile apps and customer segments to target, a sample is illustrated in *Appendix A* of government services that may possibly be provided as mobile apps.

MOBILE APPS SELECTION CRITERIA

A key step towards the development of a government service mobile app is to **evaluate and select the most suitable services to be provided as mobile applications.** This requires the consideration of the following:

- Suitable elements for unique mobile characteristics. For instance, mobility, GPS features, audio/video capabilities, etc.
- Customer segment
- Choosing the right selection criteria:
 - Public demand
 - Services with high transactions
 - Services with high frequency usage
 - Ability to generate revenue
 - Services that increase staff productivity

02

STANDARDS

The standards herein demonstrate how to design mobile applications with a primary focus on the user interface. Each standard is listed as either **Mandatory (M)** or **Desirable (D)**.

(M)

Compliance is a pre-requisite to having the mobile app published to the **Bahrain mGovernment Apps Store**

(D)

All entities are strongly encouraged to comply with Desirable standards



DEVELOP APP'S WITH SPECIFIC PURPOSE (M)

Prior to the development and deployment of mobile apps, developers must clearly define the purpose the application intends to serve. Each app should be designed to fulfil **one purpose**. Therefore, it is highly recommended to prioritize and include core features to rigorously fulfil a purpose for the target audience. Developing an app that incorporates many disparate services that aim to serve multiple purposes should be avoided.

Each entity or developer is strongly encouraged to abide by these principle standards when conceptualizing the development of a new mobile app.

The following questions in the illustrative diagram (Exhibit O2), help determine whether a mobile app follows the principle of one purpose app.

Native applications

Native Apps are specific to given mobile operating systems (iOS, Android, or Windows) using the development tools and language that the respective platform supports (e.g. Swift, Xcode, Objective-C for iOS, Eclipse and Java for Android). Usually, native apps look and perform the best as they **provide the best usability, features and overall mobile experience**. There are few things that can only be achieved through native apps:

- **Multi-Touch** – double taps, pinch-spread and other compound UI gestures.
- **Fast Graphic APIs** – the native platform gives you the fastest graphics, which may not be necessary if your application shows static screens with only a few elements or it might be very necessary if you are using a lot of data and require fast refresh.
- **Fluid Animation** – this is especially important in gaming, highly interactive reporting or for transforming photos and sounds.
- **Built-in Components** – the camera, address book, geolocation, and other features native to the device can be seamlessly integrated into the mobile app and encrypted storage capability.

Native Apps are usually developed using Integrated Development Environment (IDE). IDEs provide tools for building, debugging, project management, version control and other tools professional developers need.

Mobile Web Applications

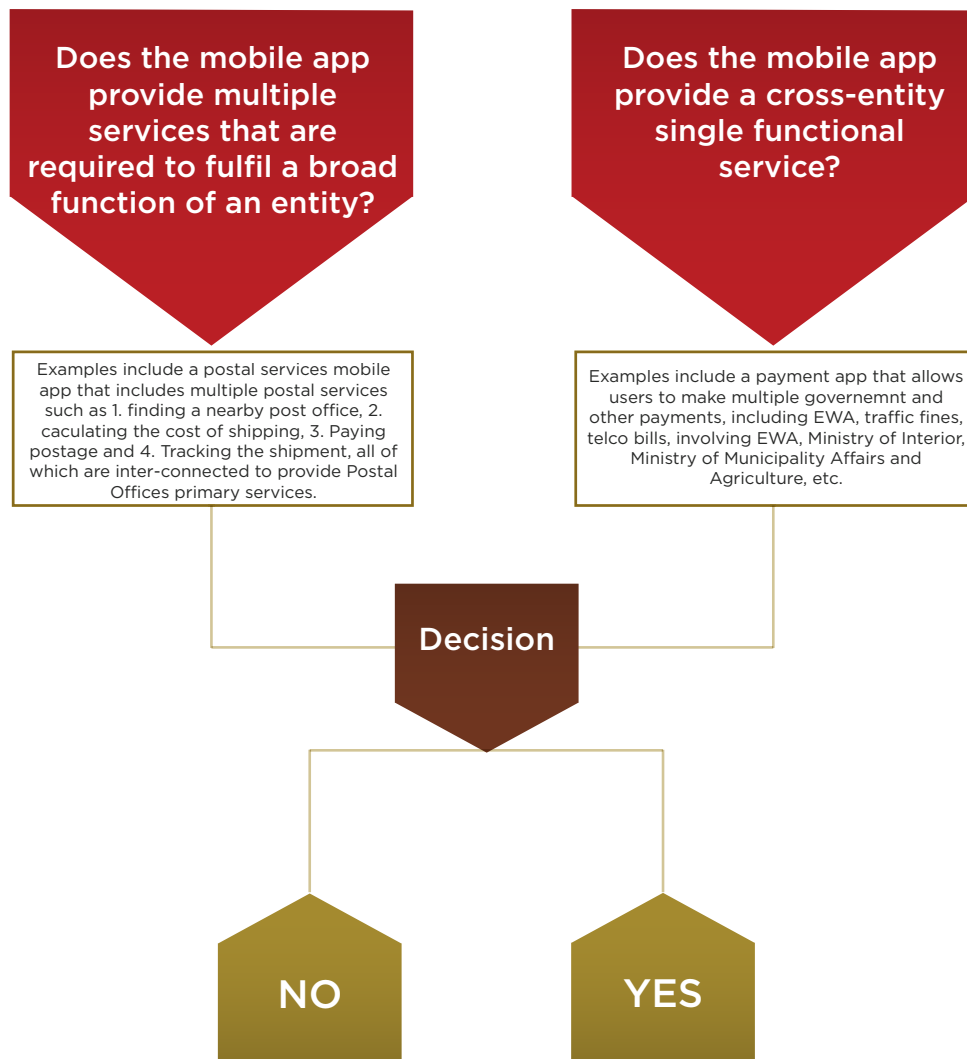
Mobile Web Apps use standard web technologies – typically HTML5, JavaScript and CSS. This write-once-run-anywhere approach to mobile development creates **cross platform mobile applications that work on multiple devices**. While developers can create sophisticated apps with HTML5 and JavaScript alone, some vital limitations remain, specifically session management, secure offline storage and access to native device functionalities (camera, calendar, geolocation, etc).

Hybrid Applications

The Hybrid Apps make it possible to **embed HTML5 apps inside a native application, combining elements of the native and HTML5 apps**. PhoneGap is an example of the most popular application for creating hybrid mobile apps.

Native apps are installed on the device, while mobile web apps reside on the web server, so a question may rise on where do hybrid apps store their files? In fact there are two methods to implement a hybrid app.

- **Local** – HTML5 and JavaScript code can be packaged inside the mobile application binary in a manner similar to the structure of a native application. In this scenario a REST APIs move data back and forth between the device and cloud is used.
- **Server** – Alternatively, a full web application can be implemented from the server (with optional caching for better performance), simply using the container as a thin shell.



(M)

As a rule of thumb, users should always know where they are in a mobile app and how to get to the next destination. Users' navigational path through content should be logical, predictable and easy to follow.

Upon launching the App, it is recommended to avoid displaying a splash screen or other startup experience. Otherwise, if the App takes time to launch or it loads in the background, it ought to display a splash screen of a logo and a name based on the below conditions:

1. If the App's name contains the name of the entity, the splash screen must include the entity's logo and name.

2. If the App's name does not contain the name of the entity, the splash screen must include the App's logo and name.

3. If the App combines multiple entities, the splash screen must include either Bahrain's standard logo and name, or iGA's logo and name. (Exhibit 03)

QUICK ACCESS & EASY NAVIGATION (D)

The user should be able to select their preferred language and the selection should be remembered persistently for future use once completed. The app should provide flexibility for the user to switch between the two languages within the application environment.

Onboarding Experience

This experience is provided to introduce the features of the App and explain how to perform common tasks. Before considering this experience, make every effort to design the App so that all its features and tasks are intuitive and easily discovered. If the onboarding procedure remains necessary, follow the below standards in order to create a brief, targeted experience that does not interfere in the user's way. The below on-boarding experiences are the recommendations, ordered from highest to least.

EXHIBIT 03 splash screen



- Progressive Onboarding Experience:

presented during the actual usage of the app. It describes the Steps or briefly demonstrates a few of the app's features that are most popular amongst users.

- Function-Oriented Onboarding Experience:

Specifies the main functionalities of the App, along with the time and method of usage.

- Benefits-Oriented Onboarding Experience:

Describes the values of utilizing the App and informs users of its numerous benefits. Adding Multimedia to the Onboarding Experience will enable the users to understand the value and the main functionalities of the App.

The multimedia main types are as follow:

1 - Videos: either implemented within the App and occupy a huge size (between 20 to 30 MB), or embedded into the App and need an internet connection.

2 - Images (screenshots): users go through series of screens that convey important points about using the App. The screenshots are not interactive and can be confused with the App UI. (Exhibit 04).

EXHIBIT 04 Onboarding Experience



Following the splash screen, the App's landing page should always be the main mService page. If it incorporates more than one mService, the landing page should display different mService options so the user can select. For example, a multi- payment mobile App landing page should include options allowing users to select and pay multiple bills with one click (Exhibit05).

Mobile Apps must have a navigation bar, located at the top of the screen (Exhibit06), to enable easy navigation through information hierarchy and management of the screen's content. When the user moves to a new level within the navigation hierarchy, the title of the navigation bar ought to be changed to the new level's title and a button must be labeled with the title of the previous level that must

appear to allow the user to return back.

The 'Back' button must always navigate back to previously entered screens. On Android, phone based back button is supporting the 'Back' button feature. Furthermore, if the user clicks the 'Back' button while in the home screen, the app should notify the user that it might exit the app if the button is pressed again. On iOS, the App must support an on-screen backward navigation.

When a user moves to more than one level in a navigation hierarchy, a 'Home' button must appear to allow the user to return to the Home screen anytime.

EXHIBIT 05 integrated payment mobile app

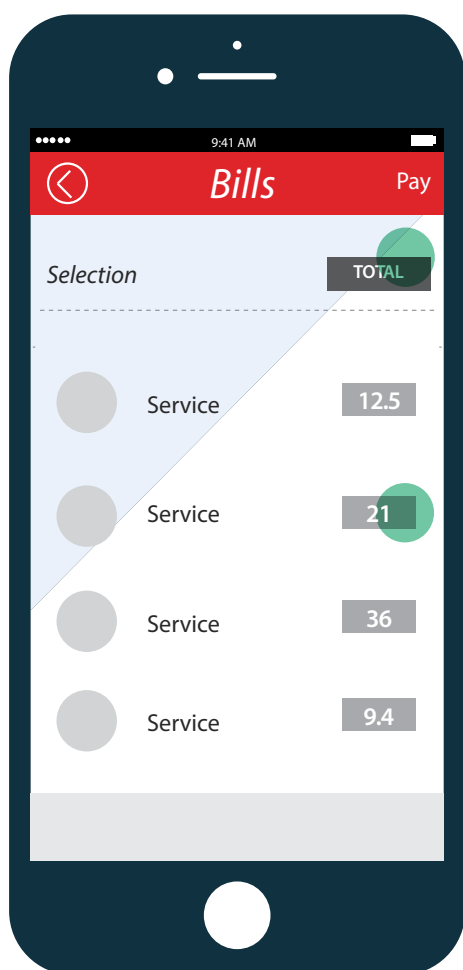
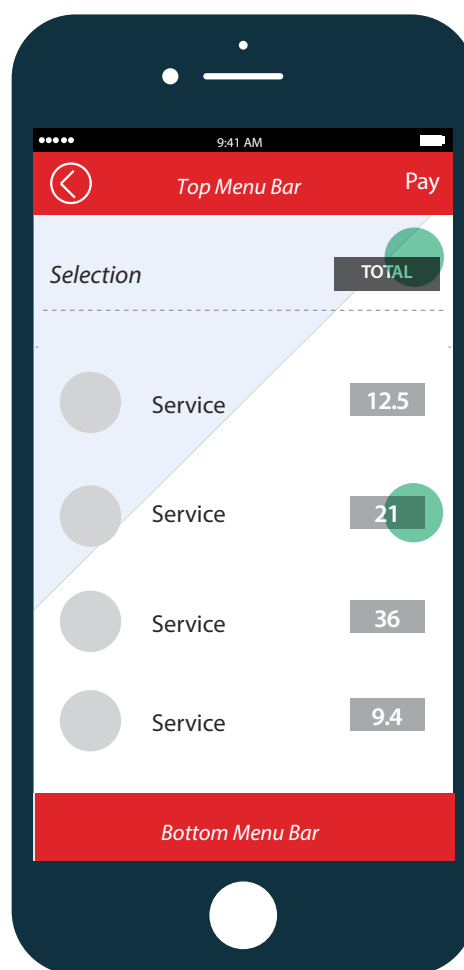


EXHIBIT 06 Navigation Bar & Menu Tab Bar Positions

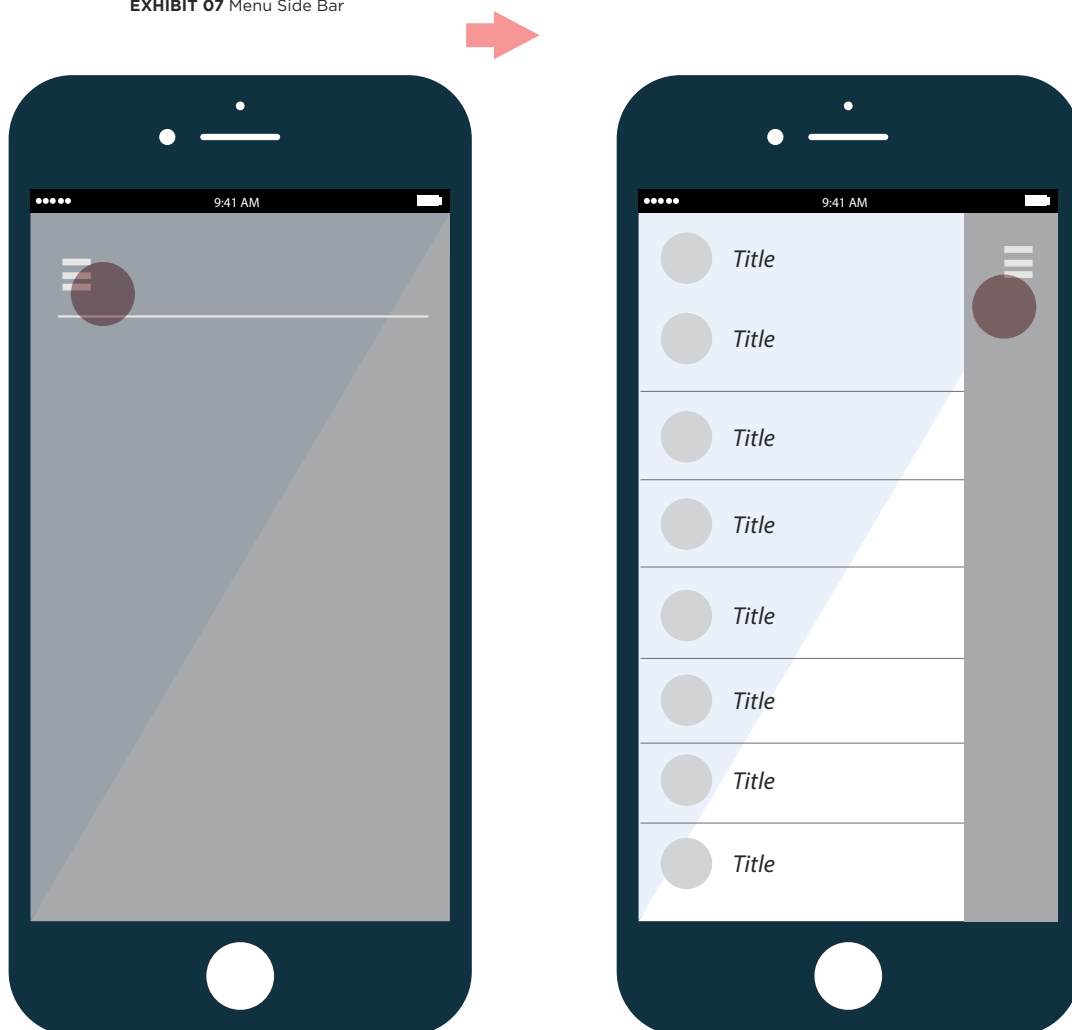


QUICK ACCESS & EASY NAVIGATION (D) (cont.)

Mobile apps should also have a menu tab bar, as shown in (Exhibit O6 in previous page), located at the bottom edge of the screen to enable easy switching between different subtasks or views. The maximum number of menu options displayed should not exceed what is permitted by the corresponding platform width (e.g. five for iOS). If there are more needed tabs than permitted on the application platform, the tab bar could have a 'More' tab to include all other remaining tabs.

If the option of collectively grouping the menu under 'More' does not make logical sense then developers can alternatively adopt the option of side-sliding bar with a variety of options as shown in (Exhibit O7).

EXHIBIT O7 Menu Side Bar



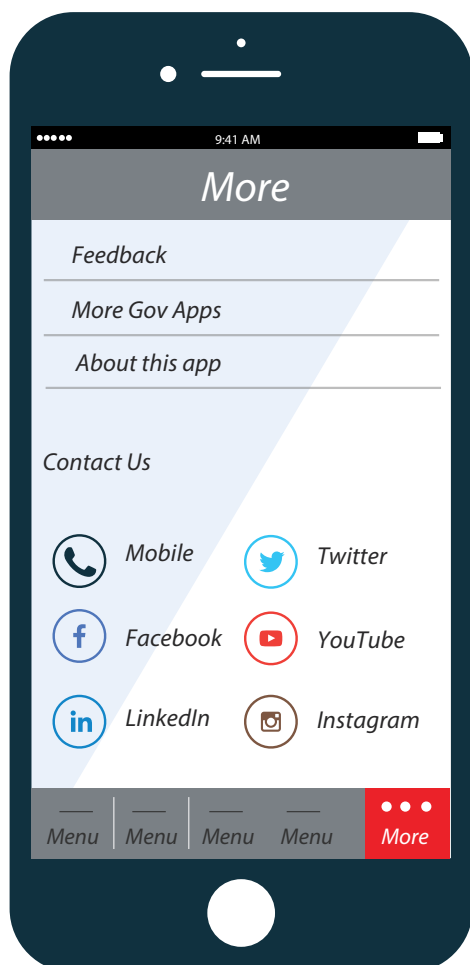
BUTTON OPENING MENU SIDEBAR

If the app includes a 'More' tab, the app should include at least the following (Exhibit 08): A 'Feedback' option redirecting the user to a page where suggestions and complaints about the mobile app can be submitted.

- A 'More Gov Apps' option redirecting the user to a directory of government apps classified by new apps, category (Education, Healthcare, Transportation, Justice and Security, Leisure, Labor, Social and Financial Affairs, Travel & Residency, and Housing) along with life events (Birth, Residential Change, Marriage, Employment and Retirement).

- 'About this App' provides a brief description of the application and includes the version number along with the entity's name and logo.

EXHIBIT 08 Options under the «More» Menu Tab



QUICK ACCESS & EASY NAVIGATION (D) (cont.)

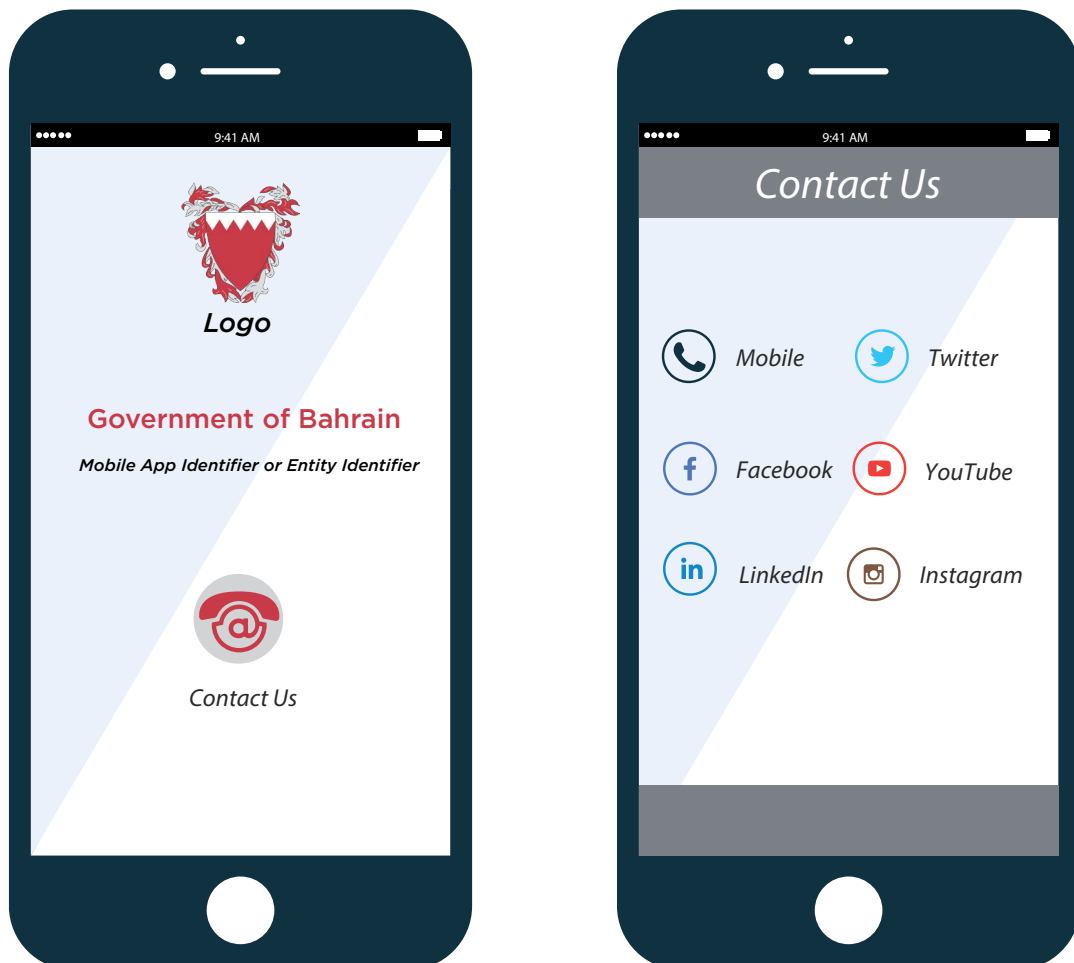
- 'Contact Us' to be located at the bottom of the page and includes:
 - Direct contact number to communicate with the government representative. The number to be clickable and diverted to the dialer immediately.
 - Entity's social media webpage links displayed in order of Facebook, Twitter and YouTube, where applicable to allow users to access the entity's social media webpages directly from within the mobile app environment and post content (achievements, contributions, suggestions, etc.) that can be shared with their contacts. (Exhibit 09)

In the event of having no 'Contact Us' section, the direct contact number together with the social media accounts must be provided in the main screen or in the 'About this App' section.

Native graphic elements, icons and buttons should be used consistently and labelled with one-word or at most two-words, reflecting its respective function. Areas that users can click on should be large enough for them to navigate comfortably and complete their tasks. As the device screen size, dpi and resolution vary; exact dimensions are not enforced. However, developers should strive for clickable areas of at least 9mm (width) and 9mm (height) wherever possible. Icons should be designed to appear clickable.

Buttons and links should also be oriented in horizontal and/or vertical rows to create a clear visual overview.

EXHIBIT 09 Contact us section

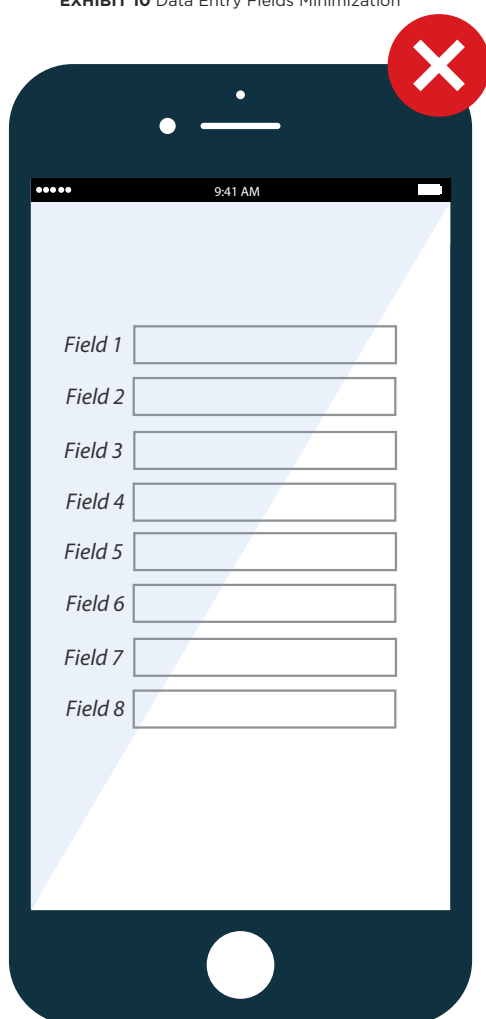


As text input in mobile devices is difficult and time consuming, data entry fields in mobile apps should be minimized and avoided if possible (Exhibit 10). Mobile apps should also automatically populate fields with stored information when applicable or use the auto-complete function to suggest phrases when a user starts to enter text. Developers should also consider other potential innovative ways to enter information such as scanning QR codes if applicable.

Having to scroll from one side to another in order to read text within the app should be avoided at all times. The number of characters (including spaces) displayed in one single row should be adapted to the screen width specific to each mobile device platform.

Wherever feasible, mobile apps should allow users to control all functionalities with just one finger. Developers should strive to minimize the number of clicks as much as possible. Furthermore, mobile apps should be designed to store non-sensitive and non-frequently updated static data directly in the app instead of retrieving data from the servers every time the application loads.

EXHIBIT 10 Data Entry Fields Minimization



Bad Example: (NOT RECOMMENDED)
too many input fields



Good Example: (RECOMMENDED)
Drop Down menus and minimum usage of fields

QUICK ACCESS & EASY NAVIGATION (D) (cont.)

Mobile apps should provide clear status information and feedback to help users know what is happening especially when the user is waiting for the app to respond to a certain carried action.

According to the iOS Human Interface Guidelines, a notification feature can be used for the following options:

- **A local notification** is scheduled by an App and delivered by iOS on the same device, even if the App runs in the foreground. Such type of notifications require to be managed by backend support. For instance, a local notification is sent to update the user's application status, outstanding and received bill payments.

- **A remote notification** (also called push notification) is sent by an App's remote server to the Apple Push Notification service, which sends the notification to every device that has the App installed. For example, announcements of new updates of the application is sent to all users.

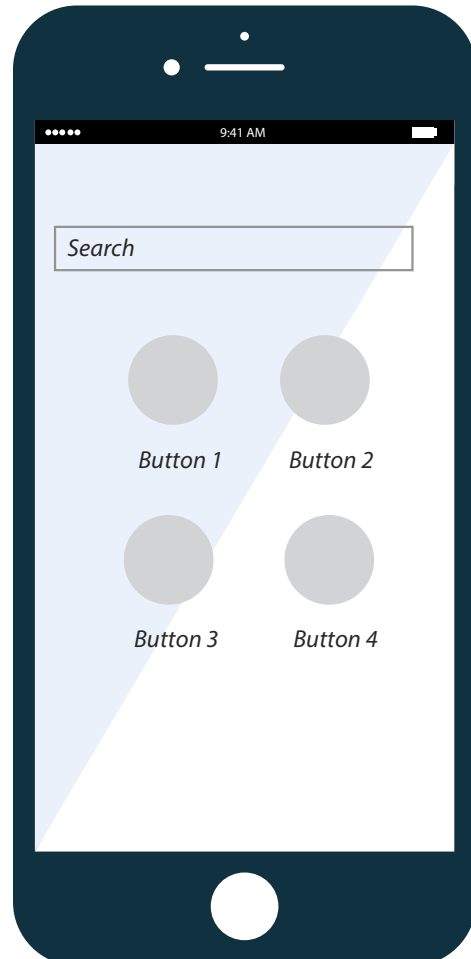
For android, if the user received a notification while the app is in the foreground, it is recommended to use the sync notification function that removes the notification from the Notification Center.

Offering both visual and audio feedback is recommended; for example, when a payment has been initiated, users can hear a distinctive sound and receive a notification informing them that the transaction has been completed. Unnecessary alerts, such as ones that provide information related to the standard application functionalities, tasks that are normally progressing or problems that users cannot resolve should be avoided. For example, an app that functions as a pedometer must not give feedback for every registered step. Alerts should only be used to deliver actionable information that warrants the intrusion.

Mobile apps should leverage as many in-built device functionalities as applicable, including location detection capabilities such as GPS

which users should be prompted to share their own location in order to detect nearest desired locations on a map; along with camera capabilities to make the mobile application more appealing and easy to use.

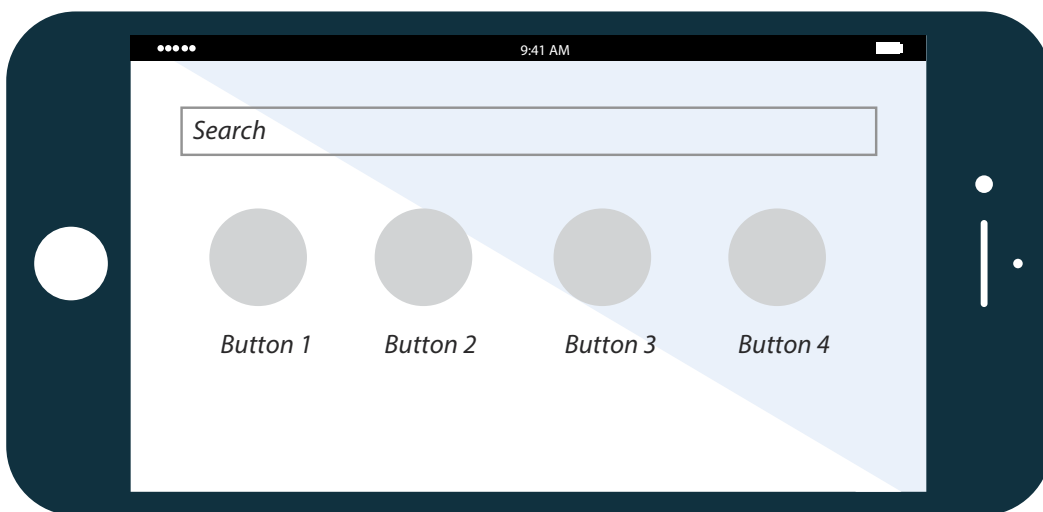
EXHIBIT 11 Portrait Displays



Mobile apps should leverage the latest trends of mobile platforms so as to allow users to directly utilize the application without a steep learning curve. For example, to delete a certain item in iOS 9 and upgraded versions; users must press and hold on the application icon, hold for few seconds until a small 'delete' icon appears on the app - tapping on the button to execute the delete action.

Finally, mobile apps should support both portrait and landscape display formats (Exhibit 11) where applicable.

EXHIBIT 11 Landscape Displays



CONSISTENT LOOK & FEEL (D)

The application should be consistent and understandable throughout, displaying a common series of actions, action sequences, terms, and layouts for users to identify the app at first glance and become familiar on how to use it.

COLOR THEME AND CONTRAST (M)

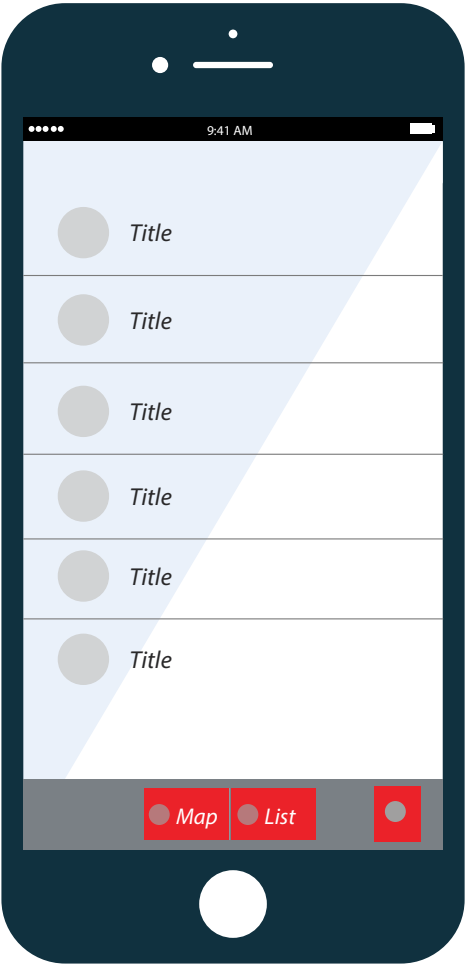
When developing a mobile app, the color scheme should reflect the entity brand that is used. Samples of hues and gradients shown in (Exhibit 12) should be leveraged as much as possible. If further colors are required, they need to fit the color scheme provided and ensure visual continuity and consistency when combined.

EXHIBIT 12 Samples of matching color themes



Mobile apps should take into consideration color contrasts that will aid users in easily identifying what is displayed on the screen. Developers should also ensure that there is no visible aliasing at the edges of menus, buttons and other UI elements. A recommended practice is to always start with a contrast of at least 50% between colors that need to be distinguishable and increase the contrast as needed after testing on the device itself. The recommended standards have been provided in (Exhibit 13).

EXHIBIT 13
Recommended Standard Tab and
Buttons contrast and sizes



Icon Size

20x20pts

Tab Background Color

Blend Mode: Normal _ Opacity: 100%
Gradient Color: #991717 _ Location: 0%
Color: #eb1d1d _ Location: 100%
Style: Linear _ Angle: 90° _ Scale: 100%

Tabbed Buttons Background Color

Blend Mode: Normal _ Opacity: 100%
Gradient Color: #790000 _ Location: 0%
Color: #d30505 _ Location: 100%
Style: Linear _ Angle: 90° _ Scale: 100%

Stroke

Size: 1px _ Position: Outside _ Color: #760c0c

WRITING STYLE (D)

General standards for text appearing in mobile apps are:

- **Concise:** Keep the text short and summarized, describing only what the user needs to know and eliminating redundancy.
- **Simple:** Using short words, active verbs and common understandable nouns, putting the most striking content first.
- **Friendly:** Using abbreviations, communicating directly to the user through the 'you' pronoun, using a tone that is informal yet not falsely jolly or patronizing.
- Text that appears in any mobile application page should follow the recommended standards below:
 - The text font should be **consistent and readable throughout the app**. It is recommended that only **one font** is applied; however, **few sizes and styles** may vary to differentiate areas of text according to semantic usage such as body and headline.
 - **Text size cannot be smaller than the corresponding platform standard**. For example, Android's text size ranges between 12 and 22 scale-independent pixel; iOS's text size ranges between 22 and 34 points.
 - Text should constantly be **distinguishable when the background is colored**. Mobile apps should **use sentence-style capitalization** for all sequences, except in certain cases such as mobile app names (Calendar, Google Drive), named features (Android Beam) and proper nouns (Ministry of Agriculture).
 - **Periods should not be used after a single sentence or phrase used in isolation**, they should only be used at the end of a sentence when followed by another.
 - The **ellipsis** character should be used to indicate incompleteness such as an action in progress (loading, downloading), abbreviated text or indicate that a menu item leads to further options. **Apps should be free of spelling mistakes and language errors** unless they are part of a deliberate design concept.

Mobile applications should display graphics, text, images, and other UI elements with noticeable distortion, blurring or pixilation (low resolution leading to users seeing squares, dots and pixels in making an image). To prevent distorted, blurry or pixelated graphics, images and other UI elements, they must be produced in high resolution quality as defined by each platform standards (application icon for iOS requires 120x120 pixels, toolbar and navigation bar icons for iOS require 44x44 pixels, etc). & (application icon for Android requires 48x48 pixels, action bar icons for Android require 32x32, etc).

To ensure that graphic images do not look skewered or too large, they should be displayed in their original aspect ratio and scaled greater than %100.

According to the iOS Guidelines, it is recommended to utilize the built-in icons as much as possible in place of the labeled buttons given that users previously recognize what they refer to. Such icons represent common tasks and types of content.

if the App needs to include labeled buttons then they should be of similar size with concise text labels that are easy for users to understand. Labels should always be appropriately sized for their corresponding buttons or UI elements. In other words, text labels should never exceed the borders of buttons. Borderless buttons can be designed but must be distinctive to indicate interactivity.

GRAPHICS, IMAGES AND OTHER UI ELEMENTS (D) (cont.)

Developers should strive to optimize layouts and other UI components depending on the screen configuration at hand to take full advantage of the available space as illustrated in (Exhibit 14).

Controls should be used in the form of either spins to show whenever a task or process with unknown duration is progressing or a progress bar to show whenever a task or process that has a well-defined duration is progressing as illustrated in (Exhibit 15). Progress bars should be used particularly when it is important to indicate to users how long a task will take.

Menu tab bars should have consistent icon illustrations and names throughout all Bahrain mobile apps. Using identical icons for different semantic meanings should be avoided.

EXHIBIT 15 Controls



spin unknown duration



bar known duration

EXHIBIT 14 Mobile App Layout Optimization



RECOMMENDED



NOT RECOMMENDED

MOBILE APP NAME (D)

The name of each mobile app should follow a short, concise, and intuitive terminology reflecting the purpose of the mobile app for usage to easily understand what the app entails. To ensure that all government service apps maintain a memorable name and consistent identity, the following standards should be adhered to, wherever possible, unless an alternative is justified, warranting an exception:

- The name of the mobile app should not be more than **two words** maximum.
- The length of the name should **not exceed the character limit of the corresponding platform** (including white space).
Abbreviated names must be avoided, for example, developers must avoid names to appear as: 'Bahrain Mobile Payment' appears as 'Bahrain M...', which is unintuitive. In this case, developers should opt for a shortened name such as 'Mobile Pay' to avoid the appearance of '...'.
- **The name** should be displayed in a **single line** regardless of whether or not the platform supports multi-line names.
- As in the case of 'License Issuance', the **first word should be the subject**, generally a noun defining the element which undergoes the service process (*License*) and the **second word** should be a verb or noun, whichever is shorter, describes the **service outcome** (*Issuance*).
- Application names should focus on creating concise names that are memorable rather than using grammatically correct parts of speech at the expense of bearing long names. For instance, mPay (*4 characters*) and Mobile Pay (*10 characters*) is preferred over Mobile Payment (*14 characters*) even though Mobile Payment is grammatically more correct.

MOBILE APP ICON (M)

The mobile app icon is an important component of Bahrain's brand. The mobile app icon should include an identifier for the owning entity and an identifier for the mobile app itself relevant to its nature and purpose. The name of the mobile app should be displayed below the mobile app icon in a single line. For mobile apps developed by government entities, entities may wish to use an abbreviated form of entity names or common words. Standard acronyms have been developed for all of Bahrain's government entities and ministries.

MOBILE APP ACCOMPANYING DESCRIPTION (D)

Every mobile app should be accompanied with a short, concise and intuitive description to give users sufficient details about the mobile app owner, purpose, target users, outcome and functionalities. It should start with phrases such as 'This app allows you to...' in order to explain the outcome of the app.

- The description should not exceed four sentences.
- There should be a unique owner clearly identified for each mobile app.
- The description should include, but is not limited to, the nature of the application's service and its benefits, along with any combination of the following key words for each app, varying from one app to another depending on the nature:
 - Bahrain
 - BAH
 - BAR
 - BHR
 - Government or Gov
 - eGovernment or eGov
 - iGA
 - Information & eGovernment Authority
 - Service owning entity name
 - Target audience (including citizens, residents and visitors).

OPERATING SYSTEM CHOICE (M)

A mobile app should be developed on at least one of the two most frequently used mobile platforms utilized in the Kingdom based on local market share. Globally, Android and iOS make up a vast majority of the Smartphone platform market, and this dominance is forecasted to continue in the foreseeable future (Exhibit 16). Locally, Bahrain is also believed to exhibit similar market characteristics.

iGA continuously consults various authorities to determine the two most frequently used mobile platforms in Bahrain and regularly publishes this information on the Bahrain National App Store website at <https://apps.bahrain.bh> for reference.

COMMON ABBREVIATIONS (D)

A list of abbreviations has been provided in Appendix C as a reference to help maximize space usage within mobile app environments. It is highly recommended that these abbreviations be used consistently across all mobile apps, if used. Private sector developers must first consult with the service providing entity, in case of adopting these abbreviations, to ensure that a consistent practice is followed by each entity for all of its public facing mobile apps.

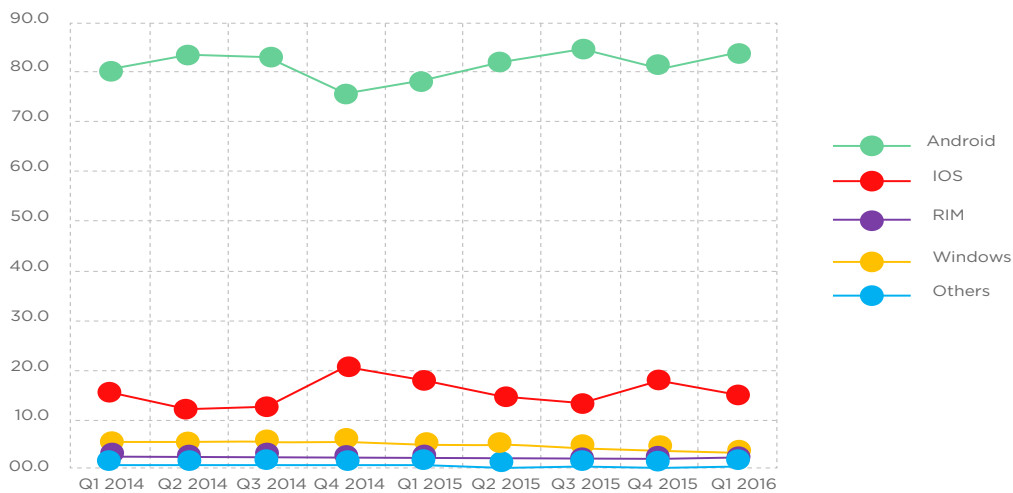


EXHIBIT 16 Smartphone Operating System Global Market Share

The ultimate platform selection decision will lie at the discretion of the service owning entity, depending on many factors, including the app's target audience, entity's budget and time constraints, as well as appropriateness of app content to the operating system. It should be noted that developing mobile apps on multiple platforms is encouraged, but is not mandatory.

INTERFACE & USABILITY STANDARDS (M)

Display resolution

The mobile app design resolution depends on your targeted device, sometimes this is known in advance. If not, the developer should remain flexible within a set of resolutions. For that reason, responsive designs are encouraged. A design without a fixed resolution should be considered. Developers are recommended to work on flexible designs that will work for a range of resolutions.

Application size considerations

- Although graphic quality provides better user-experience. While the quality of graphics makes a huge difference on user-experience, developers should consider limiting the size to certain levels as well as controlling the download time and battery usage. Neat and fast applications are preferred over slow high resolution graphic applications.
- It is recommended to keep the core application size no larger than 100MB. Additional features can be provided as add-ons or in application data download to avoid excessive memory usage.

Battery life considerations

Unlike desktops and laptops which are connected to a power source most of the time, mobile users do not recharge their devices throughout the day. Mobile users expect their devices to last at least 24 hours between recharging sessions.

While most of users realize that GPS usage consumes battery power, they do not realize that some applications will drain their battery faster than others. Therefore, developers are urged to avoid repaints, minimize both size and activity of the JavaScripts as well as constantly utilize CSS rather than JavaScripts animations for hybrid and web applications.

Terms of Use

Terms of Use Agreement is a necessity in any mobile application. Terms, conditions and privacy policy agreements should be displayed to the user at least once, preferably at the beginning of the mobile app. Displaying the agreement after the installation of the application is recommended, allowing the mobile app users to use the application once they have agreed to the Terms and Conditions.

Offline usage

Wherever applicable, allowing the user to benefit from the mobile app features and content while offline is recommended and will add more value to the application.

User guidance

Providing app users with user guidance on how to navigate through the application and its key features is highly recommended. The mobile app business owner should provide such facilities through:

- An animated help at the application loading page; i.e. multi-touch gestures are available.
- Provide a search feature within the application.
- Provide a help page for mobile application usage instructions.
- Always inform the user of on-going activity during processing periods to prevent users from thinking that the application has crashed.
- Provide an FAQ screen or link for common questions that the business owner might expect users to ask.

Impaired users

Recent mobile devices have the ability to aid impaired people with a handful of features which will assist them in using mobile apps. Mobile Apps must be tested to support these features which should be considered to increase benefit. For an example:

- Text – To – Speech feature
- Hearing Aids Features
- LED Flash for Alerts Feature
- Assistive Touch Feature
- Zoom and Colour Inversion Features

SECURITY, EFFICIENCY AND PRIVACY

SECURITY (M)

Mobile apps should strictly adhere to the standards below to ensure protection of stored information and data, as well as further minimize the information security risks and threats. iGA has developed such security standards in line with OWASP Mobile Security Project (<https://www.owasp.org/index.php/Mobile>). It is strongly recommended that developers refer to the latest set of guidelines from OWASP Mobile Security Project that are continuously updated and ensure that the following countermeasures are taken into consideration:

Usage

- Ensure that your application is published in the official mGovernment App Store to prevent malicious copies.
- Always refer users to the appropriate app store links. Do not offer the direct download of the binaries.
- Publicly announce the application through official channels.
- Only use official and secure channels for application distribution.
- Never use SMS or other notification channels to transport sensitive data.
- Provide warning messages and information that highlight security risks of mishandling the password or the device.

Development

- Follow a Secure Software Development Lifecycle (SDLC) process.
- Implement mechanisms and controls to prevent reverse engineering of app packages.
- Implement authentication mechanisms to validate user inputs.
- Utilize authorization tokens instead of passwords for integration.
- Ensure backward compatibility for at least the last two operating systems.

Access

- Always aim for a minimum set of access privileges for users to perform needed tasks.
- Keep audit trails of all requests/transactions taking place through the mobile app platform to identify potential inconsistencies with back-end systems.
- Ensure that password recovery and reset mechanisms are always channeled over a secure network; and details are sent to users' specified email addresses for verification.
- Ensure that users are able to log-in to their mobile accounts using the same credentials as the web portal and back-end systems, ensuring consistent user information across various access channels.
- Do not store passwords and sensitive data in the device, or echo passwords and sensitive data when entered into the application.
- Provide an easy process for users to change their passwords.
- Default and system generated passwords must be changed after first login.
- Ensure that a clear process for password reset is available for users.
- Always force strong and complex passwords with minimum eight characters, including a mix of lower, upper case, special characters and numerals.

Encryption

- Encrypt sensitive information and data in the device.
- Always encrypt stored personal information, passwords, error logs and location data using strong Encryptions and operating system encryption APIs.
- Restrict access to stored data.
- Use secure channels (at least 128 bit encryption) for communication with back-end infrastructure and other integrated channels.
- Utilize well-known and strong encryption mechanisms (SHA512- recommended).
- Always encrypt and protect data in transit.
- Limit information-sharing connectivity and review permissions between the app and other information sources.
- Prevent unhashed sensitive information, including passwords from being robbed.
- Limit the number of permissions and APIs the app uses to the minimum required.
- Utilize trusted certified authorities.

Session management

- Implement appropriate authentication, authorization and session management processes.
- Limit session length to an acceptable time.

Infrastructure

- Ensure back-end infrastructure is compliant with the Bahrain Information and eGovernment Authority web hosting policies.
- Stress test back-end infrastructure for performance.
- Perform vulnerability assessment and penetration tests on the infrastructure.

Log Management:

- Use-cross device libraries to monitor a real-time app performance across your entire application.
- Manage logs to automatically attain the benefit of user-level context to achieve a quicker turn-around time for bug identification and resolution.
- Configure an in-app logging to quickly identify existing or new device configurations that cause issues within the app.
- Maintain application logs for a suitable period of time - based on international best practices.

Payment

- Utilize secure interface between payment gateways and mobile payment application, ensuring compliance with PCI-DSS guidelines for payment functionalities.
- No data should be displayed in plain text anywhere in the app. In general, it is acceptable to have no more than %25 of the sensitive value displayed in plain text. For instance, four of the 16 digits of a credit card number; to allow the user to distinguish between multiple cards and accounts.
- Add an extra layer of security for mobile credit and debit card payment transactions, using -3D secure: user's identity is authenticated at the time of payment.
- The user is prompted for a password only known to the bank, ACS provider and the user, where applicable on the selected platform.

SECURITY, EFFICIENCY AND PRIVACY

EFFICIENCY (M)

The speed of the application should be adequate for the app usage. In other terms, the frame rate or response to user input should not compromise the app and user-experience.

Mobile apps should accommodate limited battery life and be able to recover from any sudden power loss. As such, developers should strive to optimize the execution time of different app operations, minimize the amount of data sent and received, properly manage network connectivity as well as allow data synchronization with the server to minimize data loss in case of shutdown. Mobile apps should be designed to store non-sensitive, and infrequently updated static information within the mobile app instead of retrieving such static data from servers each time. Failure to do so could increase data traffic and slow the transaction time, hindering the overall user-experience.

PRIVACY (M)

Users should have transparency of information, choice to control while working within an application environment. The user must be aware of the use of their personal information upfront, allowing them to make informed decisions about whether or not to use the mobile app or certain features within the application. Hence, a privacy notice should be made available for users. The notice can be in the form of a privacy policy embedded in the mobile app or linked to the website. Furthermore, mobile apps using location data should explicitly obtain permission from the user to activate this feature.

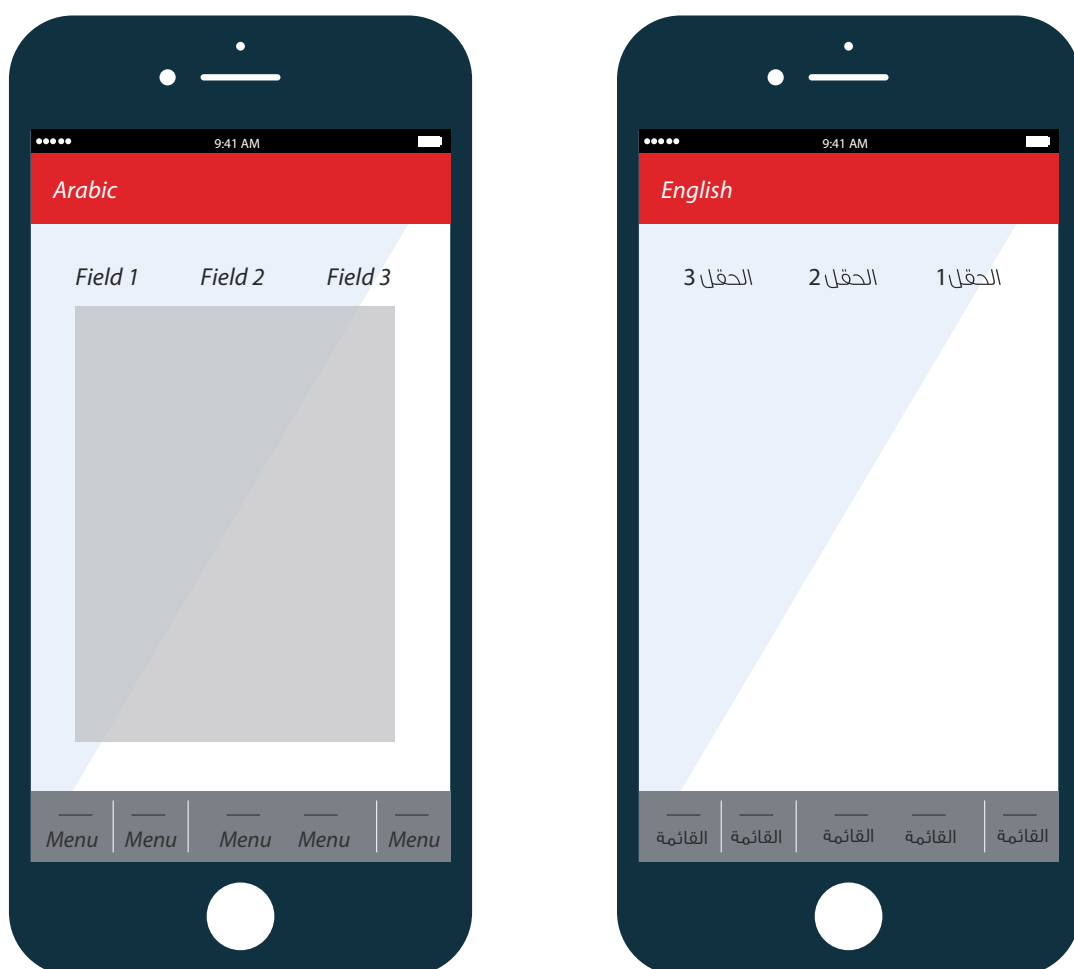
LANGUAGE (M)

The primary and preferred language for Bahrain's mobile apps is Arabic, the country's official language. All government mobile apps targeting local residents should be developed in Arabic. With the existence of resources, entities may also choose to support the English language, widely spoken amongst expats and citizens, which will allow the application to reach vast majority of the resident's population.

In some rare cases where the target audience is not the local residents, but are overseas international audience, entities may choose to develop mobile apps in English in order to serve the nature of specific audience.

As illustrated below in (Exhibit 17), users should be able to switch between two languages within the mobile app environment. Creating two of the same mobile apps separately, each for a specific language should be avoided unless the selected platform does not support the language exchange feature within the application environment.

EXHIBIT 17 Mobile App Layout Optimization



MOBILE CONTENT (M)

Mobile content is the heart of any mobile application. Presented in any type of electronic media such as text, video, audio, maps, calendars, images, etc.

In order for the user to have a good experience with a mobile app, a seamless and interactive interface design needs to be adopted to show the content.

Accessible content

- Mobile content should be delivered in a user friendly format, allowing users to easily locate and find required information while browsing.
- Developers should design the content structure by keeping in mind that mobile users seek quick access to required content and can be easily distracted with unnecessary details.

Content structure

- Content should be grouped based on information categories to provide seamless access to them.
- Providing extra content when adequate as a bonus feature will increase user satisfaction and engagement to the application.
- The content should be updated regularly whenever a change or update occurs; ensuring that the mobile's content is continuously relevant to the current time.
- For daily updated content such as news, events, feeds, etc. Link the content to a social media channel (Twitter, YouTube, Facebook) where the content should be updated at least once a day.
- Consider language options based on your targeted customers, use universal languages like English wherever necessary.

Content Considerations

Mobile apps should focus on users' needs. However, Bahraini religious and cultural values must be respected at all times. Accordingly, content related to any of the following topics is strictly prohibited:

- Gambling
- Offensive content (violence unfit for the general population)
- Nudity/sexually explicit or suggestive content
- Non-sharia compliant practices related content (alcohol)
- Illegal activities (sales of medication without prescriptions)
- Advocating against religion and leadership

Entities and individual application developers should exercise their best judgment to determine whether their apps include content that may offend the target audience. All application submissions that contain offensive content will be rejected.

ADVERTISING

Apps implementers who decide to incorporate advertisements in their mobile apps to generate revenue are allowed to proceed in a way that does not interfere with the user's readability and hinder a seamless, pleasant user-experience. As such, banners that take-up a small area near the bottom of the screen could be utilized - ensuring that they appear where they seem right and authorized. If developers wish to include third party advertising content, a clear disclaimer must be included and visible in the description of the app to allow users to select whether or not to download the application.

It is the developer's sole responsibility to ensure that advertising content does not violate any of the standards outlined in this document or pose any security threat to the user as a result.

Any application that does not comply with the pre-stated advertisement regulations will be removed from the mGovernment App Store.

MOBILE APPS INTEGRATION

NATIONAL GATEWAY INFRASTRUCTURE (NGI) (M)

The National Gateway Infrastructure (NGI) is a unified electronic platform that facilitates the process of linking government systems according to unified standards and policies; thus any government department can benefit from every service provided by other ministries. Government mobile apps should utilize the NGI to provide integrated government services to citizens, expats and other sectors.

NATIONAL PAYMENT AGGREGATOR (NPA) (M)

The National Payment Aggregator (NPA) is an initiative launched for setting-up a single, unified electronic payment solution across all government entities. The objective of NPA is to aggregate various payment mechanisms, payment service providers, payment availing entities, central monitoring and reconciliation processing. Through the integration of NPA, governmental entities which develop their own apps will gain the following benefits:

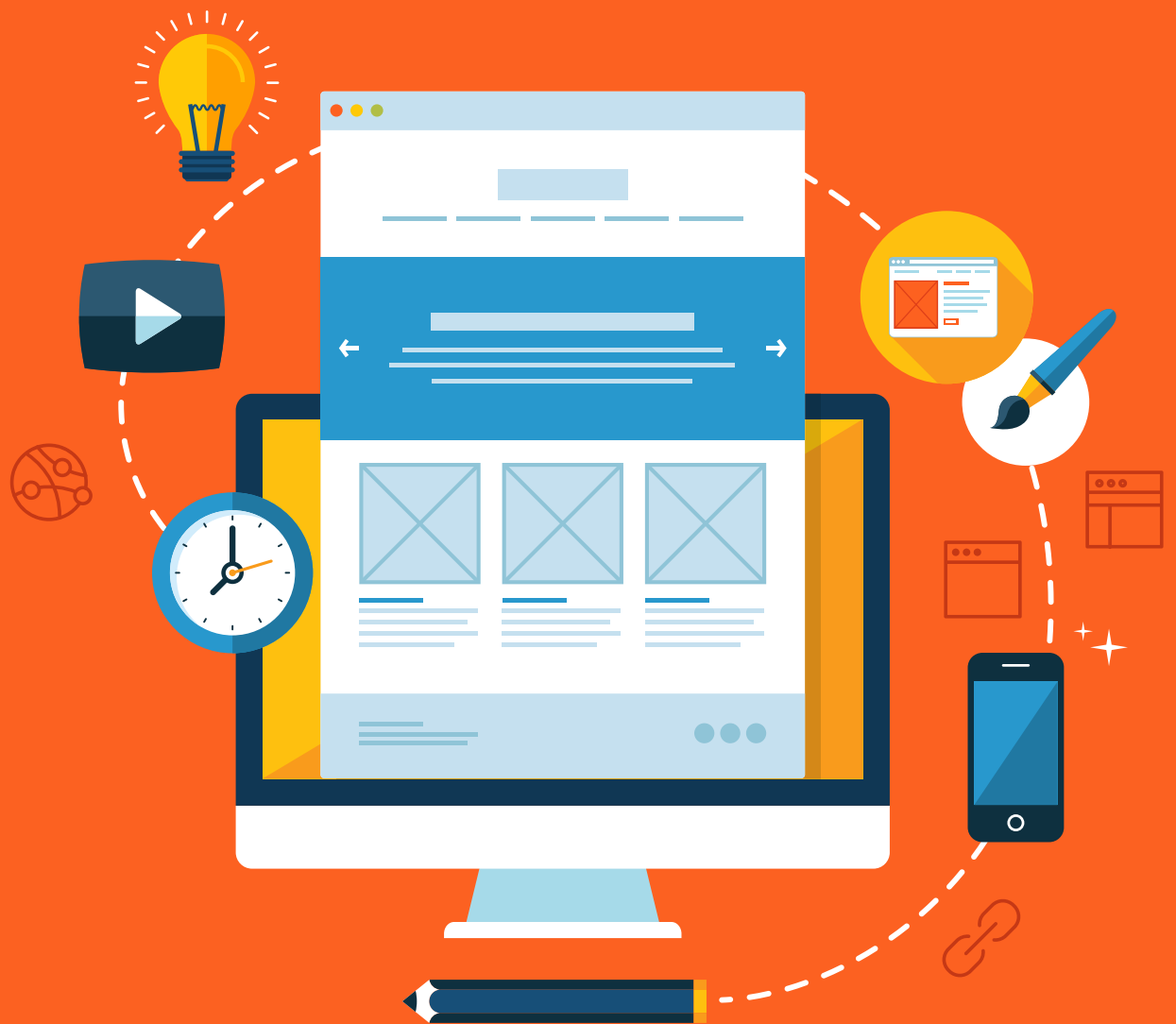
- Multiple-user login
- Online transaction reports
- MIS reports generated at any point of time
- Reconciliation and settlement features

Similar to the NGI government mobile apps, developers should utilize NPA for any application which includes any sort of payment features to benefit from the capabilities of the aggregator.

NATIONAL AUTHENTICATION FRAMEWORK (eKEY)

The National Authentication Framework platform was launched by the Bahrain information & eGovernment Authority to provide a uniform, digital, identification mechanism enabling citizens to use a single authentication login profile in order to access all government eServices and eGovernment transactions through multi-channels. The authentication process involves three levels of security - password (PIN), smartcard and biometric (fingerprint) identity verification so as to ensure that such transactions are carried-out in a highly secured environment particularly with the huge increase of eGovernment services. The eKey system will enable the private sector to deliver its services with the same key in order to offer higher levels of ease and convenience to clients of the government and public sector.

The government mobile apps will be required to integrate with the eKey platform for ease-of-use and security purposes. The platform's integration is subject to develop; however, not all services require eKey integration.



04

MOBILE APPS DEVELOPMENT GOVERNANCE PROCESS

Governance Process (M)

All government (national) mobile apps development must follow the governance process set by the Supreme Committee for Information and Communication Technology (SCICT) .

All national mobile apps developed by any government entity, private sector entities or individual developers will have to pass a quality control process - requiring approval by iGA designated team to ensure that adhere to the standards defined in this document.

Please refer to the national mobile apps governance policy published in (URL).



05

APPENDICES

REFERENCES

1. iOS Human Interface Guidelines (2015):

<https://developer.apple.com/ios/human-interface-guidelines/overview/design-principles/>

2. Introduction to Android (2015):

<http://developer.android.com/guide/index.html>

3. Designing Applications for Windows Platforms (2010):

<https://dev.windows.com/en-us/develop>

4. iOS Security (2016):

http://www.apple.com/business/docs/iOS_Security_Guide.pdf

5. Android Security Tips (2016):

<http://developer.android.com/training/articles/security-tips.html>



APPENDIX A – SERVICES SAMPLES

	INFORMATION SERVICES	INTERACTIVE SERVICES	TRANSACTION SERVICES	INTEGRATED SERVICES
G2C	Live Traffic Notification	Receive Students Attendance Report Upon Request	Pay Working Permit Fees for House Maids	Update Smart Card Residential Address
G2B	CR Expiration Notification	Inquire on CR Business Activities Requirements	Renew CR	Process Inter-Government Approvals for New CR
G2G	N/A	N/A	Share Citizen/Resident Employment History	
G2E	N/A	N/A	Provide Application to enable employees: Electricity Meter Reading Application, Issuance of Parking Tickets	

APPENDIX C – COMMON ABBREVIATIONS

COMMON WORDS	ABBREVIATIONS
LABORATORY	Lab.
LIBRARY	Lib
MEDICAL	Med
MILLION	Mn
MOBILE	m
MUNICIPALITY	Mun
NUMBER	No.
ORGANIZATION	Org.
PAYMENT	Pay
REGARDS	Rgds
REPRESENTATIVE	Rep.
REQUEST	Req
STATISTICS	Stats