# GOING MOBILE

## Part 3 of 3: Key Design, Feature, and Trend Considerations for Federal Decision Makers

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REI SYSTEMS

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## Introduction

As federal decision-makers determine how best to increase participation and collaboration among their employees and constituency through the use of mobile applications (apps), they should consider that the booming trend toward increased mobile app usage also increases the competition to build apps that engage and retain its users. This growing competition represents an opportunity for federal decision-makers to enlist the best mobile application development vendors with multiple acuities in design, development, and implementation, features, and future trends.

> Over 2 million apps are available on Apple (iOS), Android, Windows, and Blackberry. By 2017, these mobile apps will have over 200 billion downloads per year.
>
> -Portio Research

This white paper equips government decision-makers with checklists to inform their selection of vendors and ensure their existing development teams are focused on what matters. These checklists address the following mobile app development domains:

What design, development, and implementation considerations need to be made when developing a quality mobile app?

What key features need to be built into my mobile app?

What design features need to be considered in next generation of government information technology systems to actively participate in mobile development trends?

## Design, Development, and Implementation Considerations

Federal decision-makers can use this checklist to ensure development teams make the interface design considerations that create a seamless, efficient, and constructive user experience. Checking these boxes means that you have considered user experience/usability, conceptual integrity, maintainability, supportability, manageability, availability, security, and reliability for mobile app development.

| ✓ | Design Rule |
|---|---|
| | **Consider Screen Size Limitations**<br>Mobile devices have limited screen real estate, so think about providing the right functionality within limited space. |
| | **Minimize scrolling**<br>Provide information on each screen without requiring the user to scroll vertically or horizontally. |
| | **Simplify navigation**<br>If scrolling is a must, provide cues that subconsciously direct where and when users should scroll. |
| | **Create a feedback channel to users**<br>Mobile apps should interact with the user, accepting inputs and queries, and soliciting feedback and actions. |
| | **Embed on-demand help functions in the app**<br>Help prompts should be part of the application flow itself and must be context sensitive. |
| | **Use varied icon sizes and colors**<br>Icons should be designed to connote importance or focus attention. |
| | **Avoid sharp color contrasts**<br>Sharp contrasts may irritate user eyes and blinking objects can distract. |
| | **Make icons dynamic, never static**<br>Dynamic icons make the most of screen real estate, often giving users enough information without clicking. |
| | **Keep content focused and relevant**<br>Keep content below two paragraphs per topic. Mobile sites like Tumblr and Twitter are right-sized examples. |
| | **Pick a platform that supports local storage**<br>Local caching lessens retrieval time and provides a more seamless user experience in case of poor connectivity. |
| | **Use a layout that helps users process information quickly**<br>Using card stack instead of tabular models will simplify user navigation and their abiltiy to process the information. |

*A study at the University of Nebraska-Lincoln found that users are willing to wait longer for pages to load if the app provides them feedback as they wait. This includes help prompts, alerts, and notifications.*

*To authenticate users when there is no connectivity, usernames and passwords can be stored locally after the first authentication is validated through an internet connection. Microsoft Outlook stores usernames and passwords locally, so that users do not have to repeatedly re-enter it. When connected, information is pushed through, stored locally, and is ready for users to access on or offline.*

| ✓ | Design Rule |
|---|---|
| | **Limit the depth of hierarchies**<br>Avoid multiple screens and multi-layered hierarchies. Keep hierarchies under four pages so users don't get lost. |
| | **Use responsive design**<br>An app should reshape itself to fit the different screen sizes of devices on the market. |
| | **Design once, use on multiple devices**<br>Design a device-agnostic application that will give your users the same experience regardless of the tool they use. |
| | **Build for all orientations**<br>Make sure that when your user turns their device, your app adapts to the vertical or horizontal switch. |
| | **Make sure apps manage error handling independently**<br>Apps should synchronize the error log to the server during non-peak times. |
| | **Design your interface for your users**<br>Users interact with their devices differently depending on their preferences and the type of app they are using. |
| | **Design intuitive controls**<br>The location of controls should be easily accessed by users' thumbs. |
| | **Create large, actionable touch areas**<br>The user can navigate the interface comfortably since they must use their fingers instead of a mouse. |
| | **Alert and notify, but do not distract or trap**<br>Alerts and notifications should never lock users into a screen or generate audio without user's permission. |
| | **Sync it**<br>In case of lost connectivity, locally stored data should reflect the most current server updates.<br>Apps should auto-resolve stale data handling. |
| | **Secure local storage from other apps**<br>Database vendor options include SQL Lite, SQL CE, and Files. |
| | **Keep it clean**<br>Mobile devices cannot store large amounts of data. Unused data should be cleaned and purged. |
| | **Pay attention to popular UI controls**<br>UI controls must consider the way people are most comfortable using mobile devices. |
| | **Leverage the device features and components.**<br>A good cross device mobile application "fits in" with the device, and allows development once for multiple devices. |

*Each platform (e.g. Windows, Android, Apple) has their own detailed manuals to help developers to create apps on their platforms. To develop the best applications, developers should pay specific attention to these design specifications. Guidance for JavaScript and HTML 5 based frameworks (JQ Touch, jQuery Mobile, Sencha Touch 2, Appcelerator Titanium, Sprout Core, Dojo Mobile, Jo, iUI, Treesaver, PhoneGap) can be found online.*

*Synchronization can occur over the air or over the wire. Although over the air synchronization is generally preferred because it happens continuously, over the wire synchronization, which requires connection of the mobile device to a computer, persists in the federal government due to security concerns.*

*If auto resolution is impossible, alerts or notifications should prompt users to click and sync server data with app data.*

## Key Feature Requirements

When building mobile apps, decision-makers can use this checklist to make sure your teams are building applications that consider key feature requirements.

| ✓ | Key Feature |
|---|---|
| | **Invest time in considering what hardware features provided by the mobile device can be leveraged.** Hardware can include location services, camera, video, and microphone. |
| | **Consider how much information the app needs to process.** The more data a user has to manually input, the lower an app's usability. Speed could suffer if large amounts of data displayed and transmitted require high bandwidth. Offline capability is limited to the device's storage capacity. |
| | **If your user community needs to use the app sans internet, consider providing offline capability.** Invest time in creating an infrastructure to sync and merge data without loss of information. Pay attention to the amount of local storage required and the density of information collected. |
| | **Use alerts and notifications wisely.** Alerts and notifications can be used to increase user productivity by informing them with announcements, up-coming events, reminders, actionable items, status change, monitored events, feedback loops, etc. |
| | **Emphasize focus on each dashboard view** Target a specific component or logical group of related information to streamlines the use of the mobile application, and make the best use of limited real estate. |
| | **QR code scanning** QR codes simplify the transfer of lengthy URLs, paragraphs of text, contact cards, short message text, phone numbers, geo location, calendar events, emails, and wifi access point details to mobile devices. |

*Location services can provide instant access to the exact location of the user to auto-fill address fields or send vital information to track devices. Integrating camera, video and microphone features could be useful to record incident reports.*

*The mobile application should present content in a contextually concise and easily digestible fashion, enabling users to make informed decisions with very little analysis.*

*Synchronization of offline data can occur as soon as internet is available, upon docking the mobile device to a network, or using a third-party application to manually synchronize data.*

*Apps can provide light-weight, custom dashboards to visualize analytical data and act as a hub to monitor the health of enterprise applications. To do this, they must act in conjunction with the enterprise application.*

## Future Trends

While the future is impossible to predict, the obvious trend toward growing mobile development will make mobile devices more valuable to conduct government business than ever. Knowing and incorporating these trends when building your app will give you a head start.

| ✓ | Future Trends |
|---|---|
| | **Multiple devices will need to run on one system.** Designing for the many different mobile ecosystems can be complicated. Depending on a device's performance and capabilities, software engineers might choose to integrate with some or all system features. System design should start with API in mind to expose all crucial functions. |
| | **Internet of Things will change interaction with your world.** Connecting and/or tagging of the location, use, status, etc. of objects in our environment through RFID or NFC chips, barcodes, and QR codes is expected to transform the way we live our daily lives. As you design your app, consider how sensors could be integrated with equipment to provide status or perform operations using remote commands. |
| | **Inter-device communication will be essential.** Information delivery can be difficult in remote and/or disaster areas. If you intend your system to work in unreliable conditions, consider integrating existing (Apple's AirDrop or Google's Android Beam) or future peer-to-peer communication protocols into your design. |
| | **Augmented reality (AR) will strengthen a device's utility.** Mobile devices are becoming powerful enough to execute AR code, and supplement and/or enhance the real-world with computer-generated content such as graphics, sound or text. To incorporate AR functionality, consider using open source code libraries being developed by communities such as ARToolKit and ARLab. |
| | **The virtual workplace is the new office space.** The increasing use of mobile devices means work can be done from the office, home, a café, an airport, etc. If you plan to adopt this approach, make sure to have an excellent infrastructure and good leadership to mitigate the risks of increased reliance on virtual communication and decreased team spirit from lack of human contact. |

*In the near future, we may see increased use of wearable devices such as smart glasses, watches, or even clothes. One way to simplify the design of these multiple devices is to consider smart devices as different windows into the system's functionality.*

*Real life applicability could include parking space availability, quality and amount of water supply, etc. When sensors are connected to networks, they can provide the Federal government and the public with real-time information to optimize existing resource use or predict new needs.*

*AR can be useful in situations when weather, terrain or scenery does not allow a system user to make informed decision. Examples of possible use include rendering battlefield data onto a soldier's goggles in real time; or using face recognition software to mark and follow terrorist suspects.*

*A virtual workplace could mean:*

- *Reduced office space needs, as employees can telecommute and use the first available unassigned space while in the office.*
- *Increased access to experts around the country and world.*
- *Reduced travel expenses for geographically dispersed teams.*

## About the Authors

Dr. Shanthy Edward is a business development and content strategy expert with over 10 years of experience developing communications plans, organizational development strategies, training curricula, marketing materials, and proposals. Dr. Edward received her B.A. in English and Sociology from the University of Western Ontario (Canada), her M.A. and Psy.D. in Clinical Psychology from the Illinois School of Professional Psychology, and is ITIL v3 certified.

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## About REI Systems, Inc.

REI Systems (REI) is a leading provider of web-enabled business solutions for the Federal Government and the commercial sector. Drawing on our mission to deliver reliable, effective, and innovative solutions, the company works daily to solve complex homeland security, defense, health resources, criminal justice, and performance support issues. REI is strengthened by its commitment to exceeding customer expectations. REI has been serving government at all levels and major corporations since 1989. For more information, visit www.reisystems.com.

## About the REI Solution Architecture Team (RSAT)

The REI Solution Architecture Team (RSAT) is a group of skilled technical and business professionals who focus on generating new technologies, developing innovative solution approaches, and proactively addressing unmet customer needs in relation to high-priority government IT challenges. Contact RSAT at solutions@reisystems.com.

## References

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