



Motorola PremierOne™ Graphical User Interface Designed for Public Safety



Table of Contents

Contents	2
Executive Summary	3
Usability: What is it?	4
The User's Role in User-Centered Design	4
Good Design Means Understanding You.....	5
Computer Aided Dispatch: The essential component of public safety operations	7
CAD Usability Goals	7
PremierOne™ Dispatch UI Design.....	8
Mobile Data Applications: The on-scene aspect of public safety operations	9
Mobile Usability Goals.....	9
PremierOne™ Mobile UI Design	10
PremierOne™: The right design choice for public safety	11

Executive Summary

The increasing use of technology in public safety dispatch and mobile environments creates broad opportunities for police, fire and EMS agencies. New products and services can provide:

- Overall faster response times
- More accurate incident assessments
- Improved communications during emergency response situations

But like many new technologies, these solutions can also include challenges for your organization. For example, introducing new applications can mean:

- Extensive personnel training requirements
- Modifications to standard operating practices
- Periods of operational instability (response times can actually be slower)
- Increasing error rates
- End user frustration

This white paper describes the steps taken by Motorola to design its next-generation application suite (*PremierOne™*) with an understanding of public safety needs and a strong emphasis on product usability—ensuring that your organization has a smooth transition to these new technologies.

Providing a logical, predictable transition with minimal disruption requires highly configurable solutions that can easily accommodate the variety of differences between public safety agencies, while ensuring high availability, stability and security.

Leveraging the technical knowledge of new and existing personnel requires that public safety applications keep pace with changes in consumer products. Modern consumer software applications provide user interface metaphors and interaction styles that, while familiar, are not necessarily the most efficient means of accessing and responding to the multi-faceted, real-life needs of the typical public safety environment.

Using standard computer graphical user interface (GUI) tools enables you to maximize your IT investment. New users can access infrequently used functions without being overwhelmed with unknown keyboard shortcuts or command line access. On the other hand, “power users” have access to a rich command language and extensive keyboard shortcuts, enabling them to quickly respond to complex situations. Dual interaction styles in one user interface design enables new personnel to perform the necessary operations early on—while providing a path for them to continually learn more advanced interaction.

PremierOne by Motorola is where vision, innovation and technology meet.

Our goal is to provide you with technology solutions that are easy to learn and “second nature” to use. Our customers look to us for our innovation, stability and experience. Because a good leader understands the importance of listening, PremierOne was designed through direct feedback from customers who live and serve in the same dynamic environment as you do.

Usability: What is it?

“Usability is the measure of a user’s actions in the process of completing a task through the use of a tool within a given environment.”

Each component—user, task, tool and environment—impacts the way a human interacts with a product or service. Frequently overlooked until the end of product development and too often focused on product appearance, proper usability engineering methods have a fifty-year history rooted in psychology, physiology and ergonomics. More recently, national and international standards have provided guidelines to improve usability of software applications:

- ISO 9241: Ergonomic requirements for office work with visual display terminals (VDTs) (1998) is a multi-part standard that provides requirements and recommendations impacting the usability and ergonomics of hardware, software and context of use.
- ISO 13407: Human-centered design processes for interactive systems (1999) provides guidance on user-centered design methods for software applications. Figure 1 illustrates this process:

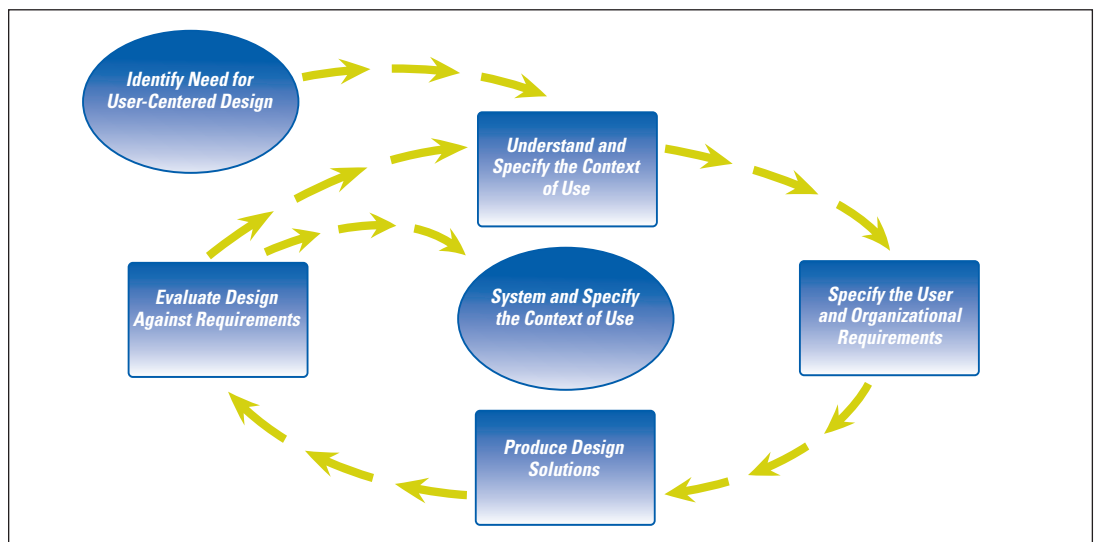


Figure 1 – User-Centered Design Process

The Users’ Role in User-Centered Design

User-centered design is both a process and a philosophical approach that recognizes the importance of software users to the successful design of a product or service. In this approach, everyone who works with the product is considered. Each user’s perspective needs to be understood and addressed, including:

- Call takers
- Dispatchers
- Communications center supervisors
- Fire fighters
- Emergency medical technicians (EMTs)
- Field supervisors
- IT administrators
- System integrators
- Deployment personnel
- Civic population served by your agency

If you are planning any changes to the products and services required to support the efficient operations of your organization, first determine that a user-centered approach is the core of any solution under consideration.

Developers of PremierOne™—a user-centered design solution by Motorola—recognized the importance of key usability elements and followed clearly defined design principles to provide an optimal solution.

Good Design Means Understanding You

Motorola developed PremierOne™ using key design principles for the public safety domain. Our design expertise includes:

- A keen understanding of the public safety environment
- Thorough task analysis and context assessment
- Interpreting your situational needs and the constraints of your environment

Critical Need: Usable applications for the public safety environment.

At Motorola, we believe the goal of a user-centered design is to create software that helps your personnel complete tasks quickly with minimum errors. Whether a Computer Aided Dispatch (CAD) operator is trying to capture information from a 9-1-1 call, dispatch a unit to respond to an incident or monitor the status of units in the field—the usability of the system determines the ease and efficiency needed to meet these objectives. The need for dispatchers to multi-task makes it essential that the information they need to make critical decisions is presented at the right time to support their mission-critical tasks.

While usability standards can provide guidance, even the most comprehensive standard can still be misapplied when not executed by well trained designers with thorough knowledge of the needs of public safety users. Motorola has the design experience needed to create the next generation of intuitive applications for public safety: PremierOne.

Usability in a mobile context: Even more critical.

Mobility not only influences the ability of personnel to quickly and accurately respond to incidents and maintain effective communication, but it additionally has a significant impact on their ability to maintain situational awareness in potentially hostile environments. Distraction due to a poorly designed user interface can present a hazard for mobile users.

Articles appearing in both public safety and usability research publications highlight this critical issue and describe the potential for misuse of mobile computers that are not designed to accommodate the specific needs of your environment.^{1,2}

Beyond the essential concerns of safe and accurate public safety systems, is the need for user acceptance: Your personnel must accept new ways to complete their tasks. Countless systems have ultimately failed in practice, not due to missing or inappropriate functionality, but due to the challenges of adapting to system-enforced behaviors, and consequent user hostility.

For a system to be effective, not only should it have the functionality necessary to support advanced interactions, but it must be designed to support critical usability goals and quickly demonstrate improved ease-of-use as a replacement for existing solutions.

Efficient and error-free task completion.

User interface (UI) design for public safety is focused on efficient and error-free task completion. Supporting efficient interactions with minimal errors is absolutely essential in a public safety operation. User interface design which helps prevent errors from occurring, or prevents them from propagating to other parts of the system is critical. Where errors do occur, error messages should describe the problem in plain language and assist with recovery by providing clear instructions for resolution.

For a dispatch application, extensible command language and keyboard shortcuts dramatically improve speed, enabling complex tasks to be executed very rapidly.

For mobile applications designed to support the maintenance of situational awareness, objects, actions and options should always be readily visible, and informational alerts should be designed to draw the attention of the user without being distracting. Interface design elements should reinforce user-friendly interaction, but where additional help is needed, user assistance should be:

- Quick and easy to access
- User-friendly and searchable
- Focused on accomplishing real tasks

Critical context sensitivity for your environment.

Public safety systems are complex, comprising aspects of:

- Centralized command and control
- Task management
- Group and one-to-one communications
- Record keeping
- Personnel management

As a result of this complexity, public safety applications must be designed to respond to critical tasks and unique environmental constraints. Portions of the application that provide communication between individuals—and especially groups—must support effective task collaboration and provide superior communication functionality. When used in a mobile environment, the system should also offer user assistance without distracting users from other primary tasks, such as driving an automobile or responding to a caller.

A unified systems approach: Why it's important for you to have a system designed to work together.

Your agency may have a mix of vendor-supplied and in-house developed systems, including one or more Motorola products or modules:

- CAD
- Mobile
- Records Management System (RMS)
- Jail Management System (JMS)

¹ Donahue, J. "Is Your Patrol Car Computer Going to Kill You?" *Officer.com*. March 25, 2007.

² Marcus, A. & Gasperini, J. "Almost Dead on Arrival," *Interactions*. September/October 2006.

The following table describes these solutions:

Product	History
CAD	<p>CAD systems are an essential component of public safety operations. The CAD user's operating environment is characterized by real-time information processing.</p> <p>They provide deployment and tracking of resources for more efficient responses to events.</p>
Mobile	<p>Mobile data applications are the on-scene aspect of public safety operations.</p> <p>They are designed to provide messaging, state query functionality and display CAD information in the field.</p>
RMS	<p>Records Management Systems (RMS) provide agencies with the flexibility to configure entry screens and work flow processes to meet their individual needs. Investigators and officers use these systems to query the records database in an easy-to-use and familiar format.</p> <p>RMS automates the capture of information and is the agency repository and reporting mechanism.</p>
JMS	<p>Jail (or corrections) Management Systems encompass state-of-the-art, integrated applications that automate operational and administrative functions of today's correctional facilities.</p> <p>JMS provides inmate management and reporting automation.</p>

Over time, these applications have become more complex and in many instances, increasingly isolated in terms of design, features, data and administration. At the same time, the demand for information accuracy, consistency and availability across applications, and the ease of administration has become increasingly more urgent.

Many agencies today have separate applications that are integrated with varying degrees of success on various platforms, operating systems and graphical user interfaces (GUIs). This adds up to a complex administrative burden.

Thanks to years of development work, the Motorola® PremierOne™ solution leverages our in-depth industry knowledge to bring you intuitive applications built on a unified architecture. PremierOne is positioned to adapt to future technological advances and your changing operational demands.

What our user-driven design approach means to you.

Motorola is the public sector industry leader today, creating innovative, intuitive applications with enhanced information sharing and reduced administrative burdens.

Increased operational efficiencies enhance community safety and service and position you for the challenges of tomorrow. Our passionate commitment to user-centered design includes:

- Customer needs evaluations
- A dedicated human factors design team
- Direct front line customer evaluation and feedback
- Design for both desktop and mobile environments
- Intuitive government applications for safety and service
- An improved, user-efficient information presentation
- A common look and feel with consistent behavior throughout the application suite
- An easy-to-learn interface resulting in reduced errors and training costs

How would your current application solutions measure up to this criteria?

How do you evaluate usability?

While specific metrics used to evaluate applications can depend on design criteria, some common questions used to measure public safety applications include how:

- Quickly personnel can complete a task (such as dispatching a call)
- Many steps it takes to complete a task (such as changing unit status)
- Many out-of-sequence steps responders have to perform to complete a task (such as recording info in a 9-1-1 call)
- Distractions impact performance (such as handling multiple incidents)

Computer Aided Dispatch (CAD): The essential component of public safety operations.

Often the communications hub of police, fire and EMS operations, the CAD user's operating environment is characterized by real-time information processing, dynamic resource management and time-critical decision making. CAD design needs to focus on user interface (UI) components and implementation methods that facilitate communications and information management. Seamless integration of services and features is essential in supporting task execution and enhancing performance.

CAD Usability Goals

Motorola is dedicated to addressing the key aspects of the public safety user's task environment and highlighting ways to improve UI design. These aspects include:

- A diverse set of tasks that range from data entry to dispatching resources
- A high volume of tasks and the likelihood of interruption
- Concurrent monitoring and managing of multiple events and resources
- Real-time information exchange between multiple sources
- Time-critical decisions involving resource allocation

Seamless workflow:

- Minimizes the navigation and actions necessary for completing tasks
- Provides consistent and efficient keyboard commands, shortcuts and navigation
- Includes design components that integrate information and support capabilities (for example, address verification and previous incident check)
- Enables effective communications, while still being flexible enough to support alternate data and voice transmissions

Support for task interruption:

- Focuses on solutions to help user's recover when interruptions occur
- Enhances the user's ability to move between tasks
- Maintains the user's position and progress when navigating between UI components

Situation monitoring support:

- Allows dispatchers to monitor pending incidents, personnel and duty roster changes—especially if large-scale incidents develop
- Communicates information that conveys a clear picture of the developing situation

A focus on information sharing:

- Maintains efficient information flow—both real-time communications as well as record keeping for archival purposes
- Assists the dispatcher in moving information through the workflow as efficiently as possible
- Includes commands and tools to manipulate information with context-optimized views

Efficient resource management:

- Monitors and adjusts dispatch assignments, area coverage, unit information and roll calls
- Directly impacts incident response
- Facilitates the allocation of resources

Integrated services and features:

- Shares information with mobile data terminal applications
- Uses seamless, consistent methods for manipulation and exchange of information across applications

PremierOne™ Dispatch UI Design

PremierOne Dispatch has identified specific UI solutions to satisfy specific public safety needs.

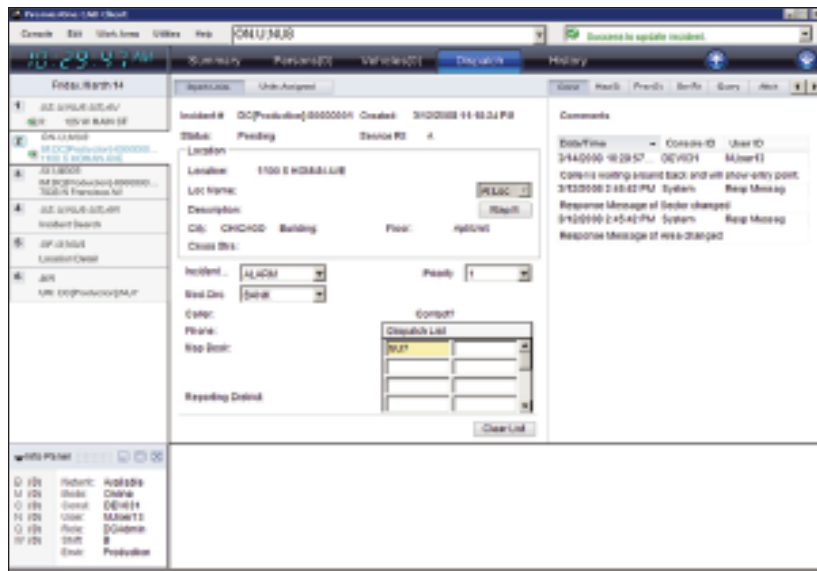


Figure 2 – PremierOne Dispatch User Interface

Visual display elements include:

- A familiar, consistent framework for users to focus on tasks
- Icons that represent traditional workflow items (physical tickets, forms, schedules, duty rosters, radios, fire arms, vehicles and geographic locations)

The command line interface:

- Reduces training time and errors due to a robust, extensible command language
- Enables quick accomplishment of complex tasks with a minimum number of key strokes
- Maintains a history of recently used commands to quickly view and repeat them

Information portholes:

- Maintain multiple concurrent events in the field
- Increase dispatchers' situational awareness and reduce response time
- Minimize UI navigation
- Provide a useful dashboard of content
- Support the automated transfer of information from the porthole to other UI components

Work objects:

- Provide organizational structure and functionality
- Allow for the input, viewing and updating of task-related information
- Possess a unique set of forms, fields and associated functions

Work areas:

- Prevent too many overlapping windows from being open at the same time
- Provide balanced functionality between two distinct work areas, the Primary Work Area (PWA) and the Work Assist Area (WAA)
- Display task-critical information without requiring you to view or navigate to other windows
- Permit you to easily switch between different tasks and services without losing track of ongoing activities with tabbed work objects

Dual-focus control:

- Provides transparent navigation between the two work areas
- Allows interaction with one work area without relinquishing focus in the other work area
- Eases navigation between work areas without having to first select the desired work area

A distributed display environment:

- Can be part of a single workstation, or any number of displays can be common to multiple workstations, enabling a multi-monitor display environment
- Delivers more information and monitoring capability to the user

Adaptive Forms:

- Enable data entry through on-screen forms
- Display data effectively, and in a format flexible enough to account for a range of situations and context
- Support intelligent form building by dynamically placing fields and labels on the screen

Mobile Data Applications: The on-scene aspect of public safety operations.

Motorola recognizes that a mobile user's operating environment is characterized by:

- Requirements for self-management and status reporting
- Functioning in an operating environment with frequent interruptions
- Powerful need for situational awareness and time-critical decision making

Because emergency personnel can be frequently interrupted, with tasks put on hold or abandoned altogether—it is essential that applications do not allow tasks to either timeout or continually prompt the user for a response.

Mobile Usability Goals

As a mobile extension of dispatch operations, the mobile data application has many of the same usability goals as a well designed computer aided dispatch application. However, operating in a mobile environment introduces additional constraints that significantly impact the usability goals of a mobile data application.

Given the mobile context of use, the mobile data application has some additional usability needs that must be satisfied. Motorola was able to define the following elements inherent in the mobile user's environment:

- Significant levels of multi-tasking between the mobile application and tasks in the surrounding environment
- A critical need to maintain situational awareness of the mobile user's surroundings
- Intermittent operations with a high likelihood of interruption and high levels of distraction
- Physical, cognitive and perceptual challenges due to variable environmental conditions

A well designed mobile data application addresses the above listed elements with:

Visual display elements which include:

- Large button, touch-screen controls with persistent rules to provide feedback on the responder's current state
- Icons that represent mobile geographic locations and/or individuals—including roles and key functionality of each location and/or person

Shallow menu structures that:

- Are simple to ensure that users do not easily get lost in deep, convoluted menus
- Provide a consistent starting point for actions to greatly simplify navigation and provide learning reinforcement

Support for situation awareness that maintains:

- Task interruption without negative consequence
- An intelligent prioritization of communications
- User position and progress when navigating between UI components—eliminating information loss

Extended situation monitoring that:

- Allows users to respond to more urgent needs—including the assistance of other mobile personnel
- Maintains direct (or at least peripheral awareness) of a wide-variety of operations
- Supports multi-task monitoring through a "porthole" approach—enabling quick selection of many ongoing activities

PremierOne™ Mobile UI Design

PremierOne Mobile has identified specific UI solutions to satisfy specific public safety needs.

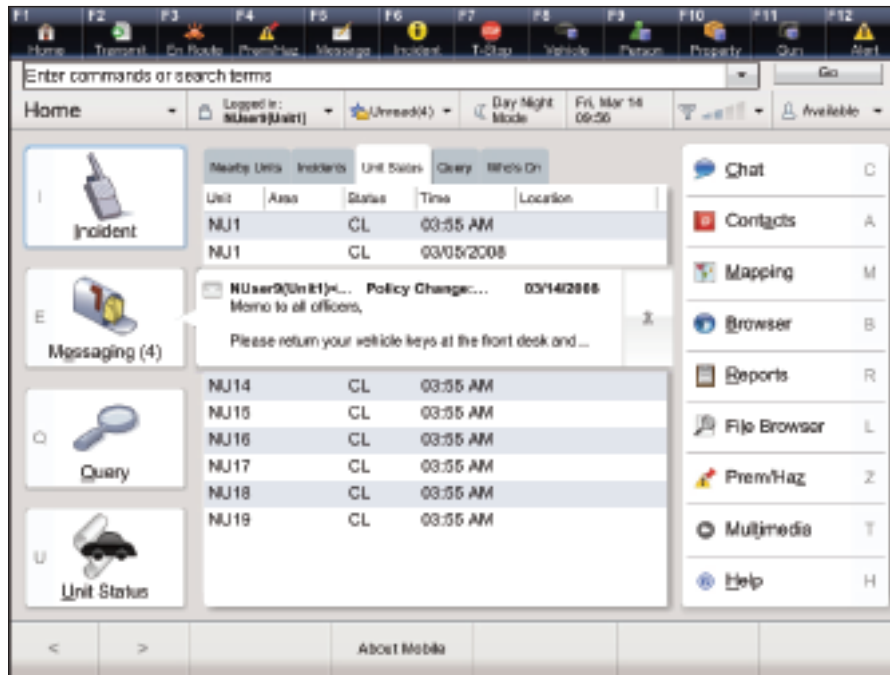


Figure 3 – PremierOne Mobile User Interface

Persistent services:

- Mobile application services never “quit” in the traditional desktop sense
- Because the last button or field is still “in focus,” or the last document is still technically open, the mobile user does not have to re-establish an ongoing task if interrupted

Integrated information management:

- The ability to take information from mapping and import it directly into field-based reporting enables the efficient re-use of information in the mobile environment
- Mobile video capture supports attaching video images or still clips to citations, incident management records or field-based reports
- The primary focus is shifted to serving the community rather than the needs of the application

Keyboard shortcuts:

- Keyboard shortcuts and a command line interface support mobile users who must frequently multi-task between activities in a critical environment
- By entering keystrokes only when they are able, responders can minimize their attention to on screen controls, and simplify their interaction with the mobile application

Persistent multi-modal interaction:

- Touch-screen controls and extensive single-touch keyboard shortcuts automatically increase users’ tactile and visual interaction experience
- Text-to-speech readout of messages supports hands-free and eyes-free operations—positively impacting situational awareness
- Advanced, speaker-independent, speech-recognition technologies give mobile users the flexibility to perform critical functions while driving without the need for computer interaction

PremierOne™: The right design choice for public safety

Technology advancement in the public safety environment provides new opportunities for police, fire and EMS agencies to accomplish new tasks and serve their constituents in new ways.

Unfortunately, with these changes comes the risk that new technologies will leave them in a period of operational vulnerability while personnel receive necessary training and make operational changes to accommodate the new technologies.

The Public Safety field has an increased awareness of the importance of product usability on the performance of dispatch and mobile data users. Usability can impact speed of operations, error rates, user satisfaction and safety, yet it is consistently the most overlooked area of new product development.

PremierOne can transform the way public safety operates, collaborates and shares information by:

- Streamlining operations and cutting response times
- Improving information access and sharing
- Providing an adaptable and flexible environment for emergency personnel
- Creating usable software solutions to optimize your operational efficiency
- Enhancing safety and service for your community

To learn more about PremierOne—the next-generation in public safety applications, visit www.motorola.com/premierone or call 1 800-323-9949.



MOTOROLA

Motorola, Inc.
1303 E. Algonquin Road
Schaumburg, Illinois 60196 U.S.A
www.motorola.com/premierone

The information presented herein is to the best of our knowledge true and accurate. No warranty or guarantee expressed or implied is made regarding the capacity, performance or suitability of any product. MOTOROLA and the Stylized M Logo are registered in the US Patent & Trademark Office. All other product or service names are the property of their respective owners. © Motorola, Inc. 2008 All Rights Reserved.