31 July 2014

DESIGN REQUIREMENTS

ICONS FOR THE GRAPHICAL USER INTERFACES FOR USE IN FEDERAL CORRECTIONAL INSTITUTIONS

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TABLE OF ABBREVIATIONS

Abbreviation	Expansion
API	Application Programming Interface
ATP	Acceptance Test Procedure
BIFMA	Business & Industrial Furniture Manufacturers Association
CA	Contract Authority
CCDA	Command Control and Data Acquisition
CCTV	Closed Circuit Television
CD	Commissioner's Directive
CER	Common Equipment Room
COTS	Commercial-Off-The- Shelf
CSA	Canadian Standards Association
CSC	Correctional Service Canada
DCMS	Door Control and Monitoring System
DES	Director Engineering Services
EIA	Electronic Industries Association
FAAS	Facility Alarm Annunciation System
FAR	False Alarm Rate
FDS	Fence Disturbance Detection System
FIU	FAAS Interface Unit
GFE	Government Furnished Equipment
IVRMS	Inmate Voice Recording and Management System
IP	Internet Protocol
MCCP	Main Communications and Control Post
MDS	Motion Detection System
MTBF	Mean Time Between Failure
MTTR	Mean Time to Repair
NAR	Nuisance Alarm Rate
NTP	Network Time Protocol
PA	Public Address
PC	Personal Computer
Pd	Probability of Detection
PIDS	Perimeter Intrusion Detection System
PIU	Perimeter Intrusion Detection System Integration Unit
PLC	Programmable Logic Controller
RFP	Request for Proposal
RTEO	Regional Technical and Engineering Officer

Abbreviation	Expansion
PPA	Portable Personal Alarm
PPAL	Portable Personal Alarm Locatable
SCC	Security Control Centre
SIO	Security Intelligence Officer
SOR	Statement / Observation Report
SOW	Statement of Work
STR	Statement of Technical Requirements
TCP/IP	Transport Control Protocol/Internet Protocol
TER	Telecommunications Equipment Room
UPS	Uninterruptible Power Supply
V&C	Visits and Correspondence
VDU	Video Display Unit
VIRS	Visits Intercept and Recording System
VMS	Video Management System

TABLE OF DEFINITIONS

#	Term	Example	Description	Function
1	Administrative User Interface		Monitor and Software that supports task specific User Interaction for System Administrators, located in a secure area	Provides Administrative Personnel with the ability to map enrolled users to the functional domains that they are allowed to access and change
2	Application	Cell Call Management, PA Management	Software that is used to deliver Application Support functionality for a sub-system	Software that provides the Operator Interface and supporting logic that allows a sub-system (Control Domain) to be managed
3	CCTV Monitor	PIDS or Range CCTV Monitor	Computer Monitor Hardware	Displays CCTV images for Operator viewing
4	Client		Rack mounted computer located in a secure area away from a Control Post or Control Desk.	Runs software and supports one or more Application
5	Configuration Data	Site floor plans showing quantity of cameras, doors, cells etc. Camera locations. Number of User Interfaces required in a Post.	Site and System specific information typically supplied by CSC that defines how a sub-system Application is to be set-up for a site, location within a site, or post.	The configuration data provides the information that a sub-system application requires to tailor it to meet site, location within a site, or post user requirements.
6	Configuration User Interface		Monitor and Software that supports task specific User Interaction, located in a secure area	Allows suppliers or qualified personnel to add, delete and modify Application Configuration
7	Contract Authority		Public Works and Government Services Canada (PW&GSC) is responsible for all contractual matters associated with the system design and implementation.	
8	Contractor		The company selected as the successful bidder.	
9	Control Console	MCCP Console, Living Unit Control Post Console	Console, typically located in a Control Post. Serves as the physical support infrastructure for Operator User Interfaces	Contains User Interfaces or Control Panels used by staff to execute their management responsibilities and interact with the Domains over which they have Control

#	Term	Example	Description	Function
10	Control Desk	Living Unit Control Desk	Desk, typically located in a Control Post or Office. Serves as the physical support infrastructure for Operator User Interfaces	Equipped with User interfaces used by staff to execute their management responsibilities and interact with the Domains over which they have Control
11	Control Domain	Cell Call, Guard Tour, Public Address	A group of Physical and Virtual devices or objects, often supported by specialized hardware and software, that performs a set of related functions	Collect information, or activate capabilities in their operational domain
12	Control Panel	PACP, Fire Alarm	Hardware and Software device that provides an Operator Interface (I/O device), located in a Control Post	Allows Operators to manage one or more Domain
13	Control Post	Living Unit Control Post/MCCP	Room or area, typically located in a secure area in an institution	Room used by staff to execute their management responsibilities and interact with the Domains over which they have Control
14	Custom Equipment		Equipment designed and/or manufactured specifically for a specific contract.	
15	Design Authority		Director, Electronic Security Systems (DES) Correctional Service of Canada (CSC) is responsible for all technical aspects of the system design and implementation.	
16	Device	CCTV Camera, Managed Door, Call Origination Device	A specialized device, typically consisting of hardware and software	Provides data collection or activate functions associated with a specific system or sub-system
17	Enrolment User Interface		Monitor and Software that supports task specific User Interaction, located in a secure area	Allows Designated Personnel to enroll and delete Users from the Command, Control and Data Acquisition System.
18	Maintenance User Interface		Monitor and Software that supports task specific User Interaction, located in the CER or Maintenance Service Provider Office	Provides Maintenance Personnel with the ability to interact with one or more Systems to carry out their day to day tasks to troubleshoot and maintain Systems and Subsystems

#	Term	Example	Description	Function
19	Notification	Notification that a door is opened, or a door is closed, or a sensor is in alarm	A notification is a message that can be shown on a User Interface and/or logged in a database that represents a change in state or a command initiated by an operator.	
20	Off-the Shelf		Equipment currently on the market with available field reliability data, manuals, engineering drawings and parts price list.	
21	Operator User Interface	PIDS Display, Door Control and Monitoring System Display	Computer Monitor and Software that supports User Interaction (I/O device)	Provides an Operator with the ability to interact with one or more Systems to carry out their day to day tasks at a Control Console or Control Desk
22	Project Officer		A CSC employee or a contracted person designated by DES to be responsible for the implementation of the project.	
23	Reporting User Interface		Monitor and Software that supports task specific User Interaction, located in a secure area	Provides Management Personnel with the ability to access preconfigured reports and to create custom reports
24	Server	Network Video Recorder	Rack mounted computer that runs software and is located in an equipment room such as a CER or TER	Runs software that is used to deliver services that support Command and Control Applications to connect to sub-systems
25	State		The state of a device as reported to a sub-system or system	This is a logical representation of the state of a device that is being monitored or managed
26	Sub-system	Cell Call, Guard Tour	A group of Physical and Virtual devices or objects, often supported by specialized hardware and software, that perform a specific set of related functions	Collects information, or activates capabilities in their operational domain
27	System	PIDS	A group of Physical and Virtual devices or objects, often supported by specialized hardware and software, including devices from sub-systems that perform a more general set of related functions	Collects information, or activates capabilities in their operational domain

#	Term	Example	Description	Function
28	Touch Screen User Interface	Door Control and Monitoring System User Interface	Typically an LCD Monitor with touch screen technology	Allows an Operator to view and interact with the Systems presented on the Monitor
29	Workstation		Rack mounted computer located in a secure area away from a Control Post or Control Desk	Runs software that is used to deliver Command and Control Capabilities

1 INTRODUCTION

.1 The intent of the Design Requirement for the Icons Graphical User Interface is to be used in conjunction with the Design Requirement for the Framework for the Graphical User Interface and the Design Requirement for each Control Post to enable the Operational Staff in each control post, as appropriate to their span of control, to conduct the operations at their control post in a manner that is consistent with the other control posts both within the individual institution and across all institutions.

2 SCOPE

.1 This document defines the essential design and functional requirements of the Correctional Service of Canada for the Icons to be used for the Graphical User Interface that is to be incorporated into the design of all User Interfaces for all control posts for Federal Correctional Institutions. The Design Requirement does not specify the actual data involved in the processes, but describes in detail the Framework for the Human Machine Interface

3 AUDIENCE

.1 The intended audience includes potential developers, suppliers or those that configure the software application that will provide both the Human Machine Interface for the functionality described in the balance of the document as well as the logic that will integrate and manage all the components of all the systems such as Microphones, Audio Recorders, CCTV Cameras, Video Recorders, Doors, Perimeter Security and Interior Security. This document must be read in conjunction with the design Requirement for each system in each control post.

4 GENERAL

.1 Current innovations in touchscreen technology have allowed other industries to optimize their control environments and present users/operators/staff with a consistent and controlled user experience and operating environment. CSC is taking advantage of a number of current and emerging advances in human-computer interaction that are being applied to physical security products and systems to gain significant benefits, the most significant of which is adopting a standard for icons and for the look and feel of interfaces used in CSC facilities.

.2 The benefits of adopting a consistent standard for future user interfaces include decreased initial training times and cost due to cross-over (either internal to an institution or across the country) of personnel. Furthermore, a system having standardized symbols, layout, and procedures aids in the creation of muscle memory which will decrease error rates under the duress of emergency situations when the user has to try to remember what the icon means.

.3 Icons can be incredible little visual devices. Their sole purpose is to communicate a great deal of information in the simplest possible way. As pictorial representations of objects, icons are critical as shorthand for conveying meaning that users perceive almost instantaneously.

.4 For these reasons, the design of the icons as part of a graphical human interface is foundational to conveying the maximum information, consistently, in the least amount of time that enables operators to take the appropriate action to any alarm or change in state that is generated.

.5 Leading edge human interface design companies recognize the critical role that icons play in conveying information, as described above, and have written guidelines for suppliers who provide applications that work within these frameworks.

.6 In order to continue providing high quality tools for operational staff, Correction Services Canada requires a Standard for its future command and control architecture that embodies the same rigour as the Standards created by companies that design leading edge human interfaces. The primary purpose of the Operator User Interface is to control and monitor devices from a control post. The devices controlled and monitored vary from control post to control post and are defined in configuration files.

.7 The User Interface must be designed in such a way that it supports multiple management

domains in a seamless and transparent manner as the system is expanded, supporting the representation of one domain through all domains that must be managed on the same User Interface.

.8 The different systems are comprised of two main components from a UI perspective, and the configuration and layout is determined by the functionality of the control post:

.1 A status display which is part of the control post

.2 A monitoring display or displays for CCTV

.9 This capability may be called upon to meet operational requirements or to meet situations in which a User Interface fails or for the aggregation of Control Post functionality as posts are reconfigured to accommodate staffing requirements. The definition of how User Interfaces in control posts provide redundancy within a control post and at another control post must be flexible and must defined in the associated configuration information.

.10 Commands originating from Operator actions at the User Interface and events that represent a change of state at a device will typically result in a message that will be “logged” by the underlying data logging services of the Command, Control and Data Acquisition Platform on which this application runs. This data can and will be accessed at a later date for evidentiary use, assessment, and follow-up.

5 DESIGN REQUIREMENTS

5.1 General

.1 The priorities for the User Interface design are to:

.1 Enable operators to respond to emergencies and situations with potential for danger effectively in a manner that ensures safety of staff, the safety of the inmates and public safety [i.e. safety is number 1] – maximizing the preservation of life

.2 Enable all tasks to be conducted efficiently and effectively – this requires the design to support operational processes in a way that are intuitive and automatic, minimizes the use of text, and do not require interpretation or memory to execute a task

.3 Consistency across all operational processes and tasks

.2 The User Interface shall be designed:

.1 Embodying best principles of UI design

.2 To present a consolidated and integrated view of numerous existing security, operations and communications systems onto one consistent user interface that can be configured across touch screen monitors

.3 To enable users to easily and safely conduct their tasks under a variety of operational situations

.4 To provide operational efficiency and effectiveness

.5 With the flexibility to accommodate the integration of future systems

.3 Thus the UI design will be clean, elegant with minimal visual clutter, as any other design will not meet the above three priorities.

5.1.1 User Interface

.1 The User Interface must use iconography and guidelines provided or approved by CSC.

.2 The preferred display layout will be based on a simplified floor plan of the whole or part of a unit based on screen space. Icons must be used instead of text where possible.

5.1.2 Human Factors

.1 The UI for the V&C and SIO must conform to accepted principles of good human factors design and be implemented according to the Design Requirement listed below:

Design Requirement for Design of Icons for User Interfaces

.2 This Design Requirement for Design of the Look and Feel of the User Interface is the second Design Requirement that forms the basis for the design of all other User Interfaces.

5.2 Detailed design requirements

.1 The Icons shall meet the following general requirements:

.1 have a single graphic (not two or more)

.2 be unique

.3 have silhouettes (outlines) that are distinct

.4 be easily recognizable, capturing the characteristics of the object it represents

.5 be readily distinguishable in different colours (i.e. must be large enough and simple enough that it is easy to tell if the icon is in different colours)

.6 be consistent with generally recognized icons, using universal images – such as using a camera shape or picture to represent a visual recording device such as a camera or CCTV

.7 be equally clear and recognizable in all sizes that are required, which may mean that there are different icons with different levels of detail at the different sizes

.8 indicate changes in state that immediately alerts the operator to that change whether by change in colour, change in graphic or action (such as flashing), or any combination thereof

.9 changes in state are to be easily determined by those who are red-green colour blind (approximately 20% of the male population). NOTE: this does not mean that red / green can't be used to indicate state change, but that only change between red and green to indicate state change with no other change (such as flashing or change in size) is not acceptable

.10 families or groups of Icons must be easily recognizable as being part of a family or group with the unique characteristics of the individual icons still being easily recognizable - for example all variations of CCTV icons must have a consistent element and a distinguishing element

.11 fit within the overall context and layout of the UIs; each icon must be different, while still working together as a whole, i.e. each icon must work harmoniously with the other icons

.12 icons having a similar role are designed with a similar style (including perspective, shadows, colour, gradients). Icons that represent a device that would require action would have a style different from passive elements / devices, such as walls.

.13 show optical balance and perceived accuracy in perspective and details

.14 not use words or numbers on icons (unless essential)

.15 must have a unique file name system wide

.16 there will only be one icon to represent a particular element and each state of that element used system wide

5.3 Functional requirements

.1 The following functions must apply:

.1 The following functions will apply to the represent the different states of the different categories of icons:

.2 Passive / wallpaper elements will remain on the main UI at all times and will not change. These architectural elements form the backdrop against which all the other elements are displayed.

.3 Active monitored elements will remain on the main UI at all times, and will change form to indicate any activity associated with that element. A unique form for each state is required. The potential change in form associated with a change in state is described in Item 6.8 above.

.4 Elements that are not actively monitored, but which generate alarms**, will be optionally be repres**ented as "ghosted" or not visible until an alarm is generated,

when the element that generates the alarm changes form, and the rest of that set of elements are shown on the main UI as “ghosted”. When an element generates an alarm, it becomes visible on the UI.

.5 Elements that are masked are those which normally generate alarms, but the alarms have been turned off at the control panel. There needs to be an indication that those elements are active and in steady state, but alarms from those devices will not be reported.

.6 Mobile elements would initially be represented as a stationary icon in the region / range where that element would report an alarm.

.7 Some icons represent elements for which commands are sent from the MCCP or the range office. Selecting the icon itself (such as a controlled door or a CCTV with a wiper) would bring up a new window that offers the commands related to that icon, such as “Open Door” or “Turn on Wipers”. Optionally, these actions may be represented by icons. Any icon which is used to generate or choose a command, or is used to select a group of edge devices to which commands are sent, needs to be large enough to be able to be selected on a touch screen, by people with all sizes of fingertips.

.8 Some icons would represent elements that are actively controlled from the MCCP or the range office. In this case, it is likely that an icon representing that element, such as a joy stick, would have an icon in a tool bar, and the activation of that icon would bring up a new window that would enable the end user to send the appropriate commands to that element or control the movement of that element These comments are related to how the icons would function, and the expected need for toolbar icons, rather than the design of the icons.

5.4 Technical requirements

.1 As part of the Icon design, the following technical attributes of the Icons will be specified:

.1 The size required for each icon. The size of the icon will be determined by its location and its use. The standard size for icons in toolbars is 22x22 or 24x24 pixels (small), the standard size for icons in menus or lists in applications is 16x16 (tiny), and the standard size for desktop applications is 48x48 pixels. There is also medium – 32x32 pixels used by Windows XP. The standard sizes for use in the next generation UI for each of toolbars and menus will likely differ from the design requirements described in the previous sentence as they must be easily and readily be invoked on a touch screen rather than by a mouse. The exact size for each use and location will be specified.

.2 Use of shadows, gradients and anti-aliasing

.3 Size of the border for each different sized icon (such as 1 pixel for a 16 x 16 pixel icon)

.4 Colour palette for each icon or group of icons

.5 Perspective for each group and / or type of icon, whether table or shelf

.6 Whether each group of icons should be realistic, photorealistic or illustrative