User-Centered Design Requirements for Maritime Chat Clients in Network-Centric Warfare

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Abstract

Chat has become a dominant communication vehicle for the military. Based on a compilation across multiple stakeholders and inputs (CNA, DISA, SPAWAR) the following compilation of chat tool requirements is recommended for implementation to meet user needs in a dynamic, maritime coalition environment. Implementation of these requirements will enable chat tools to more effectively and efficiently (a) facilitate situation awareness, (b) allow users to gain access to chat information in a timely manner, (c) provide optimal record keeping (archive) storage and retrieval capabilities, (d) facilitate timely message composition, transmission and receipt, (e) provide user identification, presence and status information, and, (f) provide system administrator the capabilities to ensure chat tools run smoothly and that updates can be implemented in a systematic and effective manner. Standard implementation of these requirements is a clear step toward efficient use of collaborative technology and interoperability between sites.

1 Objective

This report outlines the user-centered requirements for maritime chat clients. These requirements were developed from several recent analyses, experiments and at-sea observations. These user requirements provide information to help guide the Navy design, acquisition and use of chat tools.

2 Background

Chat is a software tool for text-based communications, where conversations among multiple users are organized by topic into what are called channels or "chat rooms." Chat has become a practical and indispensable means of real-time communication among naval personnel (Catanzaro, Gwynne, & Mitchell, 2005). Chat is presently being used in situations that, in the past, would have been conducted using voice/radio circuits. Thus, chat serves a similar purpose to voice and includes functions such as exchanging tactical data or logistical information, providing situation awareness, and troubleshooting. Chat may be used between stations on a single ship (i.e., engine room to the bridge), among ships in a fleet, or among fleet and shore stations. The use of chat in Naval operations is not only limited to ships, as it is also used in P-3 aircraft where communication is required among its larger crews.

Currently, there is no standard Navy chat tool. A significant number of different chat tools are in use and these tools are often unable to communicate with one another. The lack of compatibility across systems has potentially severe implications for the FORCEnet initiative, where interoperability is critically dependent upon communications. For example, during maritime operations, it is not only necessary that ships communicate with one another, but also that ships are able to communicate with aircraft. Interoperability and communication efficiency would be improved if the Navy were to use a standard chat system.

In addition to the lack of standard chat tools, these is little consensus on the way chat should be employed in the fleet or on the chat features that users need to be effective in a maritime environment. Human performance studies and analysis can provide empirical data about user-centered requirements for chat features.

3 Summary of Related Chat Studies

To guide design decisions, objective human performance data were used to identify and test specific user requirements. This was done through analyses of existing chat tools, sea trial events, and distributed multi-lab experiments.

Trident Warrior (TW) has been the primary sea trial event used to examine maritime chat. For example, in TW05, five different chat tools were examined in an at-sea exercise involving United States and coalition units. Additionally, the Human Performance Assessment Capability (HSPAC) afforded a distributed multi-lab facility for experimentation in chat features. HSPAC is uniquely capable of examining existing and formative systems in terms of human performance data. The data collected may then be presented in various ways to guide acquisition, modification, design and development of human user systems.

The various reports relating to each of the studies conducted can be found in the Reference section. If desired, the various reports can be made available.

4 Specific User-Centered Design Requirements

Based on the studies referenced above, derived user-centered requirements are offered in the following section. The requirements are organized by general or high level categories.

4.1 Facilitate Situation Awareness

4.1.1 Automatically refresh the conversation frame.

4.1.1.1 Do not require the user to select <Refresh>.

4.1.2 Once reconnected to a chat room 'prefill' the conversation frame with archived (missed) messages.

4.1.3 Timestamp incoming messages.

4.1.3.1 Date Time Group (DTG) – format to be developed for system-wide application or by command, or geographic area.

4.1.3.2 Provide capability for user to turn DTG (timestamps) on/off.

4.1.4 Display layout should support viewing multiple chat rooms without an operator action, e.g., tiled layout.

4.1.5 Annotate messages as read by user, e.g., change color, italicize, bold/ unbold.

4.1.6 Notify user that a new message has arrived.

4.1.6.1 Allow user to control this feature (on/off).

4.1.7 Notify user when a chat room participant logs off or has lost connection

4.1.7.1 Allow user to control this feature (on/off)

4.1.8 Notify user when own connection to chat room is lost

4.1.9 Provide capability for user to set criteria and notification means to be notified when:
4.1.9.1 A user of interest logs into a chat room,
4.1.9.2 A user of interest sends a message to the chat room,
4.1.9.3 To the user personally via IM/whisper.

4.1.10 Provide support for keyword notification and highlighting.
4.1.10.1 Support user defined keywords.

4.2 Login and Initial Login Configuration

4.2.1 Streamline the login process so that it takes less than 1 minute.

4.2.2 Provide the capability for the system to remember and reconfigure user preferences upon login (specific to user account).
4.2.2.1 Automatically join specified chat rooms.
4.2.2.2 Automatically display chat rooms as previously displayed (e.g., tiled layout, Intel chat room still appears in left top corner, etc.).
4.2.2.3 Invoke all user-set preferences as to notifications, users, keywords, etc.

4.2.3 Provide a "Broadcast Topic" notification upon joining a chat room, e.g., "You have joined the <name> chat room, the current topic is <_____>.

4.2.4 Provide for automatic reconnect to chat rooms after lost connection.
4.2.4.1 User may specify number of automatic attempt to reconnect, (e.g., attempt 10 reconnects and then notify user of failure).
4.2.4.2 User may specify time interval for reconnection (e.g., attempt reconnect every 15 seconds).

4.3 Logging and archiving of chat

4.3.1 Support automated logging and archiving (as opposed to manual 'cut and paste').
4.3.1.1 Archive and log should contain DTG and release information.

4.3.2 Provide capability for user to 'save out' any conversation to a directory of the user's choice directly from the chat interface, e.g., by selecting <Save> from the main menu/ toolbar to save the specific, ongoing conversation.

4.3.3 Provide capability for user to print any conversation without accessing the logging or archiving functionality.

4.3.4 Provide tools to the user for accessing archives.
4.3.4.1 Recall/ display messages based on user criteria, e.g., last 20 messages, last 2 days, from time to time, display logs that contain a keyword, etc.
4.3.4.2 Provide user a capability to control the portion of archived messages downloaded.

4.3.5 Provide user ability to stop downloading archived messages in progress.

4.4 Message sending options

4.4.1 Provide option to use <Enter> key for submitting messages (in addition to clicking 'Send' or 'Submit').

4.4.1.1 Allow user the option to specify <Enter> key to act as a carriage return.

4.4.2 Provide the capability to send messages to only one user (private message/whisper) that can be enabled or disabled at the command level.

4.4.2.1 This capability may require development of policy on private messages.

4.4.3 Provide global list of users (so that user can identify all logged in users and avoid joining scattered chat rooms in attempt to locate users)

4.4.4 Enable a buddy list (e.g., "Users I correspond with most").

4.4.5 Provide for chat room moderator and/or system administrators to:

4.4.5.1 Broadcast system messages to all users in a chat room, e.g., system will be rebooting in 20 minutes. (These system messages would not have the user's name appended to the message),

4.4.5.2 Broadcast system messages across all chat rooms (e.g., Message of the Day (MOTD), and

4.4.5.3 Broadcast messages to entire chat server audience.

4.5 Message composition

4.5.1 Provide the capability to cut and paste a message from any chat room for sending in a different chat room.

4.5.2 Provide the capability to copy formatted text from another application (e.g., MSWord) and paste into chat room.

4.5.2.1 Preserve the text style and line spacing when pasting into chat room (e.g., same carriage returns, indentation, etc.).

4.6 Chat room characteristics

4.6.1 Chat rooms are named.

4.6.2 All chat rooms have a specified moderator (who has advanced capabilities, e.g., sending a broadcast message to the room to indicate a status message or topic change).

4.6.3 Provide global list of chat rooms

4.6.3.1 List should reference the number of users in each chat room and the topic of conversation in the chat room

4.6.4 Each individual chat room display should be able to be minimized or maximized.

4.6.4.1 The chat room should include a list of users logged in to chat room.

4.6.5 For moderated rooms, the chat room moderator may invite any user that is logged into the chat server to join the chat room.

4.6.6 Provide the capability for authorized users to create new chat rooms.

4.6.7 Provide the capability for multiple chat room types.

4.6.7.1 Permanent chat rooms (rooms that remain open even after all users disconnect or log out), and

4.6.7.2 Transitory chat rooms (rooms that disappear/close after last user disconnects or logs out).

4.6.8 Provide the capability for varying access levels for chat rooms:

4.6.8.1 Public rooms (all users can see the rooms and all users can join the rooms),

4.6.8.2 Private rooms (all users can see the rooms, however, must be invited to join, or be on an access list, and/or have password)

4.6.8.3 Hidden rooms (only users with access can see and join)

4.7 Chat system characteristics

4.7.1 Provide a list of all users logged into the system.

4.7.1.1 Indicate what chat rooms these users are currently logged into.

4.7.2 Provide a list of all chat rooms in the system.

4.7.2.1 Show number of users currently logged into each chat room.

4.7.2.2 Provide user an ability to distinguish between those rooms s/he has already joined on the list (e.g., double click room name).

4.7.2.3 Provide direct ability to join one or more rooms via the list of chat rooms.

4.7.2.4 Show DTG of last activity in that chat room.

4.7.3 Provide tools for user to interact with the chat room list:

4.7.3.1 Sort chat room list by: number of users in room, alphabetically, etc.

4.7.3.2 Search by parameter: word strings (name, theme, or messages), by category, etc,

4.8 User information

4.8.1 Support creation and viewing of user profiles:

4.8.1.1 User name/ nickname/ contact information

4.8.1.2 Functional / organizational position or title

4.8.1.3 Geographical and/or organizational location (as appropriate)

4.8.2 Support user status:

4.8.2.1 Provide specific user status, e.g., online, idle (minutes), active, etc.

4.8.2.2 Provide active/idle status indicators that are visible via the chat room user list, e.g., place an icon next to the user's name

4.8.2.3 Provide capability for user to indicate that they are away from their console/station.

4.9 Provide support to the system administrator role:

4.9.1 Create and delete chat rooms

4.9.2 Broadcast of a Message of the Day (MoTD) across all chat rooms

4.9.3 Chat room access control lists

4.9.3.1 Monitor privilege at user and group level

4.9.4 Provide for invisible monitoring of chat rooms

4.9.5 Creation of user accounts

4.9.6 Editing of user profiles

4.9.7 Maintain/update server passwords

4.9.8 Update system-wide software, firewalls

4.9.9 Pair networks to chat rooms for controlled access

4.9.10 Designate chat room moderator

4.9.11 Designate chat room type

4.10 Workstation and Display Configuration and Control

4.10.1 Support default layouts based on user position needs and/or user preferences. In addition, allow:

4.10.1.1 Chat window resizing

4.10.1.2 Various display layouts (e.g., tiled, tabbed, etc.)

4.10.2 Chat system should 'remember' each layout, preferences and settings for each user.

4.11 Provide online and offline help.

4.11.1 Provide online access to help topics via toolbar or menu.

4.11.2 Provide online feature help via roll-over tool tips.

4.11.3 Provide access to offline help documentation (manual).

5 User-Centered Procedural and Policy Recommendations

Chat users, during the various studies, were quite willing to articulate their recommendations on chat policy and chat procedures. In some cases, the state of the technologies and the realities of band width may mitigate against full implementation. These recommendations are included at this time so that they may be considered and implemented if they are supportable. The most frequent of these recommendations are listed below.

5.1 System Administration

5.1.1 System administrators should create user accounts prior to users logging into the system.

5.1.1.1 Users must still activate account (one time) on initial login.

5.2 New Chat Rooms

5.2.1 Develop policy on criteria for creating new chat rooms. As a minimum address:

5.2.1.1 Conditions under which new rooms can be created, and

5.2.1.2 Who has the authority to create new rooms.

5.3 Chat Room Message Logging and Archiving

5.3.1 Develop policy for logging and archiving based on chat room type.

5.3.2 Develop policy for logging and archiving whisper and private messaging.

5.4 Message composition, message enhancement, and message attachments

5.4.1 Provide the capability to create and save a message to a buffer for later sending (e.g., if system is disconnected for 10 seconds, message is held in bufferand can be re-sent on connect).

5.4.2 Provide the capability for varying font sizes, types, styles and color.

5.4.2.1 Preclude use of fonts of less than 10pt.

5.4.2.2 Provide a color palette that is appropriate for text messaging (eg., avoid light colors such as yellow text)

5.4.3 Provide for animation in user notifications (blink, flash message on/off, etc.).

5.4.4 Provide capability for user to control the range, frequency and duration of the animations.

5.5 References

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