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COMMANDER WIRELESS HANDHELD PROTOTYPE SYSTEM DEVELOPMENT

TA15 SYSTEM REQUIREMENTS SPECIFICATION Version 1.5

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COMMANDER WIRELESS HANDHELD
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Version 1.5

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Abstract

Commanders need to be continuously aware of the evolution of the operations under their areas of responsibility in order to provide directions. They also need to know the tempo of their planning staff as well as the evolution of the plans in order to provide guidance as required. Even if, in order to accomplish the different aspects of their work, commanders are often outside of their offices or their command posts, they need to continually have access to information and knowledge related to the current operations and the operations being planned. JCDS21 TDP demonstrated how wireless handheld technology can be used to allow a commander to participate in the planning and the monitoring of operations while being away from his headquarters (HQ).

This document's purpose is to provide specifications for the components that would be required to implement the wireless handheld tools defined in the Statement Of Work (SOW) for their use on the JCDS Test Bed project. This System Requirements Specification (SRS) is a preliminary report that will serve as a foundation for future efforts with regards to wireless technologies. The product, Commander's HandHeld Support System (CHESS), is a proof of concept that helped refine the requirements for this type of technology in a military context.

Résumé

Les commandants ont un besoin continu d'être à l'affût de l'évolution des opérations dans leur zone de responsabilités afin de pouvoir donner leurs directives. Ils ont aussi besoin de connaître le tempo de leur état-major de planification ainsi que l'évolution des plans afin de pouvoir fournir leurs directives au besoin. Même si, afin d'accomplir les différents aspects de leur travail, les commandants sont souvent hors de leur bureau ou de leur poste de commandement, ils doivent continuellement avoir accès à l'information et aux connaissances relatives aux opérations courantes ou en cours de planification. Le « JCDS 21 TDP » a démontré comment la technologie mobile sans-fil peut être utilisée pour permettre à un commandant de participer dans la planification et le suivi des opérations tout en étant hors de son quartier général.

Ce document a pour but de fournir des spécifications sur les composantes qui seraient nécessaires pour l'implémentation des outils mobiles sans-fil, décrits dans l'énoncé des travaux, pour leur utilisation sur le projet « JCDS Test Bed ». Ce « System Requirements Specification (SRS) » est un rapport préliminaire servant de fondation pour d'éventuels efforts en ce qui a trait aux technologies sans-fil. Les diagrammes inclus respectent les normes UML. Le produit, Commander's HandHeld Support System (CHESS), est une preuve de concept qui a permis de raffiner les besoins pour ce type de technologie dans un contexte militaire.

Executive Summary

Commanders in today's military reality are required to be able to respond to events at any given time. Unfortunately, their duties also require them to handle a large number of responsibilities. In order to remain operational with a good understanding of the situation while being part of the decision and planning process, the commanders need a set of mobile and versatile tools that can follow them everywhere. The "Commander's HandhEld Support System (CHESS)" project aims at providing this kind of capability via the use of a smartphone or a "Secure Mobile Environment Portable Electronic Device (SME PED)".

CHESS was developed to be integrated in the JCDS 21 Test Bed environment. The main systems to which it connected to were COPlanS, Command View, "Incident Management System (IMS)" and "Execution Management and Plan Adaptation (EMPA)". Although smartphone technologies are evolving very rapidly providing very advanced capabilities, CHESS had to be limited to the capabilities available to the SME PED. The project demonstration helped producing and refining official technical documentation such as a preliminary System Requirements Specification (SRS) report as well as a preliminary System Architecture and Requirements Allocation Description (SARAD) report. These reports include slightly more details than would normally be provided in order to allow them to evolve through future efforts. The project also led to the production of various reports including the following:

- Concept of Operation of proof of concept;
- Military Information Types and Requirements;
- Analysis and Recommendations about BEA Mobility Server;
- Technical Comparisons: Windows CE and Windows Mobile 6;
- CHESS User Guide;
- CHESS project Lessons Learned.

The lessons learned in the CHESS project are based on the comments and feedback received during the JCDS 21 TDP experimentations as well as from the notes and observations of the project's team.

Important lessons from the experimentations include:

- Target audience should be revised as the Commanders mentioned it would be quite possible that the device would be used by one of their direct Second In Command (2IC) officers;
- Mobile wireless technologies will impact the following subjects at various levels, requiring adaptation within the CF:
 - Business processes;
 - User habits;
 - Education requirements for new technologies.

Fortin, S. 2009. Commander Wireless Handheld Prototype System Development System Architecture & Requirements Allocation Description (SARAD). JCDS-CTB-FJ-TA15-232-0232. Defence R&D Canada – Valcartier.

Sommaire

Les commandants, dans la réalité militaire d'aujourd'hui, doivent être en mesure de répondre à des événements à n'importe quel moment. Malheureusement, leurs devoirs nécessitent qu'ils soient aussi capables de s'occuper d'un grand nombre de responsabilités. Afin de continuer à être opérationnel avec une bonne compréhension de la situation, tout en faisant parti du processus de planification et de décision, les commandants ont besoin d'un ensemble d'outils à la fois mobiles et versatiles pouvant les suivre peu importe où ils sont. Le projet « Commander's Handheld Support System (CHESS) » vise à fournir ce type de capacité par l'utilisation d'un téléphone intelligent (smartphone) ou un « Secure Mobile Environment Portable Electronic Device (SME PED) ».

CHESS a été développé pour être intégré à l'environnement d'expérimentation du JCDS 21 (Test Bed environment). Les principaux systèmes auxquels il doit se connecter étaient COPlanS, Command View, « Incident Management System (IMS) » et « Execution Management and Plan Adaptation (EMPA) ». Malgré le fait que les technologies des téléphones intelligents évoluent très rapidement offrant ainsi des capacités avancées, CHESS a dû être limité aux capacités disponibles pour le « SME PED ». La démonstration du projet permis la production et le raffinement de documentation technique officielle tel que le rapport « System Requirements Specification (SRS) » préliminaire ainsi que le rapport « System Architecture and Requirements Allocation Description (SARAD) » préliminaire. Ces rapports contiennent un peu plus d'information que la norme afin de leur permettre de facilement évoluer à travers des efforts futures. Le projet a aussi mené à la production de différents rapports incluant les suivants :

- Concept of Operation of proof of concept;
- Military Information Types and Requirements;
- Analysis and Recommendations about BEA Mobility Server;
- Technical Comparisons: Windows CE and Windows Mobile 6;
- CHESS User Guide;
- CHESS project Lessons Learned.

Les leçons apprises dans le cadre du projet CHESS sont basées sur les commentaires reçus durant les expérimentations du « JCDS 21 TDP » ainsi que des notes et observations des membres du projet. Parmi les leçons les plus importantes des expérimentations, nous retrouvons les suivantes :

- L'audience visée devrait être révisée, car les commandants ont mentionné qu'il serait très possible que l'appareil serait utilisé par un de leurs officiers assistants.
- Les technologies sans-fil mobiles auront un impact à divers niveaux sur les différents sujets suivants, nécessitant une adaptation au sein des Forces Canadiennes :
 - Processus d'affaire ;
 - Habitudes des utilisateurs ;
 - Besoins d'entraînement pour les nouvelles technologies.

1. About this Document

This document represents the Software Requirement Specification (SRS) for a Wireless Handheld Tool for a Commander. It describes the functions of the Wireless Handheld Tool.

It is defined in the IEEE 12207 methodology and based on a variety of documents as well as expert discussions. Its format may differ slightly since it was adapted for the scope of this project.

1.1 Identification

This document is the Software Requirement Specification (SRS) and its purpose is to identify the software requirement for the “Commander Wireless Handheld Prototype System Development” project (also known TA15). This document, referred to by Document control number: JCDS-CTB-231-0262, was produced on a R&D project led by DRDC Valcartier under the JCDS (Joint Command Decision System) 21 Core Test Bed (CTB). This R&D project is named “Commander Wireless Handheld Prototype System Development.”

The purpose of this document is to provide specifications for the components that would be required to implement the wireless handheld tools defined in the Statement Of Work (SOW) for their use on the JCDS Test Bed project.

1.2 Disclaimer

This document is a work in progress. The releasable “preliminary” version, as per the “Statement Of Work”¹ (SOW) and “Technical Proposal”,² is provided as one of the project deliverables.

Since it is a preliminary document, sections will be left empty. Those sections will be completed or removed as the project (or subject) evolves.

To preserve the standard SRS structure, some of the sections will contain a simple acronym to indicate the status of the section in question. The following list describes the acronyms to be used and their meaning:

- N/A: Not Applicable
 - This is used when the section is deemed irrelevant to the project in its current form. That does not mean it cannot be changed, depending on the directions the project could take.
- TBD: To Be Determined
 - This is used if the information is currently unavailable for this section, but it would be necessary in the short term. It can be related to various constraints that prevented the project from gathering the required information.

¹ DRDC Valcartier, *Statement of Work - Commander Wireless Handheld Prototype System Development*, February 2008, W7701-05-3182, Task Authorization TA15, 10 pages.

² FUJITSU Consulting (Canada), *Proposal - Commander Wireless Handheld Prototype System Development*, 4 April 2008, W7701-05-3182, Task Authorization TA15, 18 pages.

2. Introduction

2.1 System Purpose

In today's reality, technologies guide or influence the way we do business. We have entered the technology era where information is to be available everywhere at any time. In a military context where commanders have to move regularly out of their office, and other static or mobile Command and Control facilities, the need for them to remain connected is of critical importance. Therefore the requirement for mobile technologies aimed at allowing Commanders to maintain access and interact with command support tools and processes necessary for them to exercise their authority under a wide range of operating conditions is essential.

Commanders, to remain effective must retain situational awareness regardless of where they find themselves. In addition, their absence from their main headquarters must not have a negative impact on both the tempo of operations and the timeliness of the planning cycle.

Therefore, Commanders need to be continuously aware of the evolution of the operations under their areas of responsibility in order to provide directions. They also need to know the tempo of their planning staff as well as the evolution of the plans in order to provide guidance as required. Even if, in order to accomplish the different aspects of their work, commanders are often outside of their offices or their command posts, they need to continually have access to information and knowledge related to the current operations and the operations being planned.

The goal of the TA15 project is to demonstrate how wireless handheld technology can be used to allow a commander to participate in the planning and the monitoring of operations while being away from its HQ. This demonstration will be done with a minimum of two systems: one supporting the situation awareness of operations (COMMAND VIEW) and one supporting the planning of operations (COPlanS). By trying to bridge these two different systems to a wireless handheld device, TA15 will identify what are the possibilities and the limitations of current technologies to share, exchange information related to planning and the monitoring of operations. The analysis of the results obtained will be used to identify and refine requirements related to the use of a wireless handheld device for a commander

2.2 System Scope

The project will enhance the Commander's ability to perform his duties by providing him simple, rapid access to a knowledge Web portal. The intent is to help him by providing the ability to remain fully engaged in both the decision-making and planning process related to the conduct of current operations as well as deliberate planning. In addition, it will provide the commander with the ability for timely dissemination of orders, instruction and guidance to Staff and Subordinate Commanders.. The wireless handheld device, via the use of existing solutions like Command View and COPlanS (Collaborative Operation Planning System), will allow a Commander to be aware of the situation related to his daily

tasks wherever he is at all times and let him manage events even far from his Headquarter (HQ).

**THE SELECTION OF ALL ENABLING TECHNOLOGY
MUST BE BASED ON CLEARLY DEFINED USER REQUIREMENTS**

**THE COMMANDER'S HAND HELD SUPPORT SYSTEM (CHESS)
MUST ENHANCE AND SUPPORT THE FOLLOWING KEY COMMAND &
CONTROL PROCESSES AND FUNCTIONS**

**INFORMATION
MANAGEMENT**

**PROVISION
OF TIMELY SA**

**CONNECTIVITY
WITH KEY
C2 FACILITES &
TOOLS**

**ACCESS TO
DECISION
SUPPORT
PROCESS &
TOOLS**

**ACCESS TO CRISIS
& REGULAR
PLANNING
PROCESS &
TOOLS**

**THE AIM IS TO PROVIDE AND MAINTAIN ACCESS FOR THE TARGETED
COMMANDERS TO HIS SHARED INFORMATION SPACE
WITH A VIEW OF BEING CAPABLE OF DELIVERING
THE RIGHT INFORMATION TO THE RIGHT USER AT THE RIGHT TIME TO
HAVE THE DESIRED EFFECT AND OUTCOME**

**IN THE END THE COMMANDER MUST BE ABLE TO RECEIVE AND INTERACT
WITH THE ABOVE COMMAND SUPPORT FUNCTION TO SEAMLESSLY
EXERT HIS AUTHORITY REGARDLESS OF HIS LOCATION**

Figure 1 - Functional Diagram of CHESS support to Commanders on the move

A first project,³ aimed at identifying the requirements for a wireless handheld tool for a Commander, was completed in January 2008. Initially, a comparative study was conducted to identify market trends and available technologies (both hardware and software), evaluate various technologies and make recommendations. Based on the results of the comparative study, a wireless handheld device was selected and purchased for developing a first proof of concept, after a concept of operation (ConOps) was produced in order to provide the basis for a first usage scenario. The TA15 drew on the results of the first project to identify its requirements.

³ **FUJITSU Consulting (Canada)**, *Identification of Requirements Related to the Use of a Wireless Handheld Tool for a Commander – Final Report*, January 2008, W7701-5-4996, RFQ 72864, 85 pages.

Some components were not chosen for because of budget constraints, because of low prioritization by the DRDC TA15 Scientific Authority, because they fall under the responsibility of other TA teams due to the nature of their projects and the fact that TA15 is in a data consumer mode.

One of the projects that had a major influence on the TA15 is the “Canadian Cryptographic Modernization Project”. One of the objectives was to determine the secure wireless devices that the Canadian Forces will acquire. The product, referenced to as SME PED (Secure Mobile Environment Portable Electronic Device), is based on a project from the NSA (National Security Agency) in the US (United States) where both General Dynamics C4 Systems and L-3 Communication Systems-East were mandated to create a device that is capable of TOP SECRET level voice communication and SECRET level data communication. The solution considered for the TA15 project was the Sectera® Edge™ smartphone. All development done on the TA15 project had to be compliant with both SME PED specifications. The solution was only tested and demonstrated on the L-3 device during the first JCDS 21 experiment.

The main work will be done in a Windows Mobile and/or Windows CE environment. Tests and experimentation will be conducted on a Windows CE cryptographic device and/or a Windows Mobile based solution, with most access being via a closed network,⁴ provided by Prolity Corporation, using WI-FI (IEEE 802.11b/g) wireless communication as well as via the Rogers GSM/GPRS/EDGE/HSDPA network when or if possible.

The environments provided by the JCDS 21 CTB will cater to the physical, computing and networking requirements necessary to develop, integrate and execute the systems employed on the Wireless handheld project.

The following shall be considered in the development of CHESS (Commander’s Handheld Support System) system requirements:

- **Experiment and Demonstration Considerations**

- Provision of means to assess technologies and systems in joint command decision making;
- Provision of means to assess human factors in joint command decision making; and
- Ability to support distributed online demonstrations, experimentations and validations;
- Ability to use wireless communication (voice and data) while respecting security constraints of the provided environment.

⁴ **Prolity Corporation, Michael Raz**, *JCDS21 Exercise Communications/Network Plan TA 25 Draft V0.5 19 Sep 08*, September 2008, 23 pages.

- **Current Operational Baselines and Emerging Technologies Considerations**
 - Operational requirements, system of systems specifications and technical requirements related to CF integrated command and control capability initiative;
 - Current and future CNet baselines in terms of constraints, protocols, services, applications, infrastructures, policies, etc;
 - Current and future JCDS 21 CTB baseline in terms of constraints, protocols, services, applications, infrastructures, policies, etc;
 - Existing and developmental strategies for new technology integration into CNet baseline.
 - Existing and developmental technology integration strategies related to development of baseline;
 - Human-system integration strategies and human factors concepts in a distributed collaborative environment;
 - Existing and developmental advanced knowledge management strategies and technologies;
 - Existing and developmental computer-based decision aid and risk management tools and technologies;
 - Existing and developmental shared situation awareness, intelligence; operations management and execution control tools and technologies; and
 - Existing and developmental visualization and content representation tools and technologies.
- **External Activities.** The following projects or activities are likely to play a role in influencing the CHESS system requirements and implementation and shall be considered:
 - 2010 Olympics
 - CF JIIFC Detachment Initiative (CommandView);
 - Incident Management System (IMS);
 - Execution Management and Plan Adaptation (EMPA);
 - DRDC Collaborative Operations Planning System (COPlanS);
 - Canadian Cryptographic Modernization Project;
 - JCDS 21 Core Test Bed.

2.3 Acronyms and abbreviations

Table 1 – Acronyms and abbreviations

ABBREVIATION	MEANING
C2	Command and Control
C2IS	Command, Control and Intelligence System
C4ISR	Command, Control, Communications, Computers, Intelligence Surveillance & Reconnaissance
CCIR	Commander Critical Information Requirement
CCIRM	Control Co-ordination Information Requirements Management

ABBREVIATION	MEANING
CF	Canadian Forces
CFCS	Canadian Forces Command System
CFEC	Canadian Forces Experimentation Centre
CFXNET	Canadian Forces Experimentation Network
CNet	Classified Network
COA	Course of Action
ConOps	Concept of Operations
COP	Common Operational Picture
COPlanS	Collaborative Operations Planning System
COTS	Commercial off the Shelf
CTB	Core Test Bed
DND	Department of National Defence
DoD	Department of Defense (USA)
DRDC	Defense Research and Development Canada
DRENET	Defence Research Establishment Network
DWAN	Defence Wide Area Network
IEEE	Institute of Electrical and Electronics Engineers
ISSO	Information Systems Security Officers
IT	Information technology
J Staff	Joint Staff
JC2IS	Joint Command Control and Intelligence System
JCDS 21	Joint Command Decision Support for the 21 st Century
JTFG/ICC	Joint Task Force Games / Information Coordination Cell
NDCC	National Defence Command Centre
NDHQ	National Defence Headquarters
NGO	Non-Governmental Organization
OGD	Other Government Departments
OPP	Operation Planning Process
OPPCE	Operations Planning Process Collaborative Environment
PBX	Private Branch Exchange
PC	Personal Computer
PDA	Personal Digital Assistant
RFC 3261	RFC 3261 - SIP: Session Initiation Protocol
RFI	Request For Information
SA	Situation Awareness
SIP	Session Initiated Protocol
TCP/IP	Transport Control Protocol/Internet protocol
TD	Technology Demonstration
UMPC	Ultra-Mobile PC
UNCLAS	Unclassified
VCDS	Vice Chief of the Defense Staff
VTC	Video Tele Conference

2.4 CHESS Requirements Challenges.

The following challenges and information requirements for a Commander in a mobile or wireless context shall be considered for the development of the CHESS system requirements:

- Difficulty to synchronize Battle Rhythms among HQs and with OGDs;
- Lack of tools to facilitate collaborative work:
 - Need to execute in sync with other stakeholders; and
 - Operations and resource management need to support self-synchronization.
- Need to increase collaborative workspace to foster understanding of how each other works;
- Plethora of info sources (structured & unstructured) exist: no common structure for storage system or accessing information: user information requirements huge;
- Information is not always organized in a format that enhances collaboration;
- Difficulty identifying components in decision making process. Emphasis needs to be on the quality of the decision, decision making process and justification of decision;
- Limited risk assessment support tools;
- Difficulty identifying critical information elements for decision making:
 - Presenting the information in a way that helps identify actions to be taken (action knowledge);
 - Developing and analyzing courses of action, including resource management, predictive analysis, risk analysis; and
 - Virtual collaboration environment to support distributed command is required.
- Delays in change detection or assessment:
 - Delays during re-planning/inappropriate re-planning (good options overlooked or implications of options not fully understood);
 - Goal/priority mismatch between levels of command.

2.5 Concept of Employment

The Commander's Handheld Support System must provide the flexibility to use different mechanisms of communications and networks to establish and maintain contact with, his staff, superior and subordinate commanders and partners via (cellular phones, VOIP phone, TCPIP (email, chat, Web) data streams (audio, speech, text, video, maps). This ability to transmit and receive information must be maintained in an environment often characterized by limited bandwidth, unstable connectivity and different security domains. In order to remain effective, Commanders must maintain situational awareness, have the ability to remain fully involved in the decision making process linked to both the conduct of current operations and support to the planning process.

2.6 System Overview

This section positions the “Commander’s HandhEld Support System (CHESS)” within the JCDS 21 Project Technology Demonstrator (see Figure 2 - JCDS 21 TDP Overview), which includes all systems that will be demonstrated at the end of the JCDS 21 project. Some systems will be demonstrated separately and independently (sub-systems A to n) and others will be integrated into the JCDS 21 Test Bed Environment (TBE).

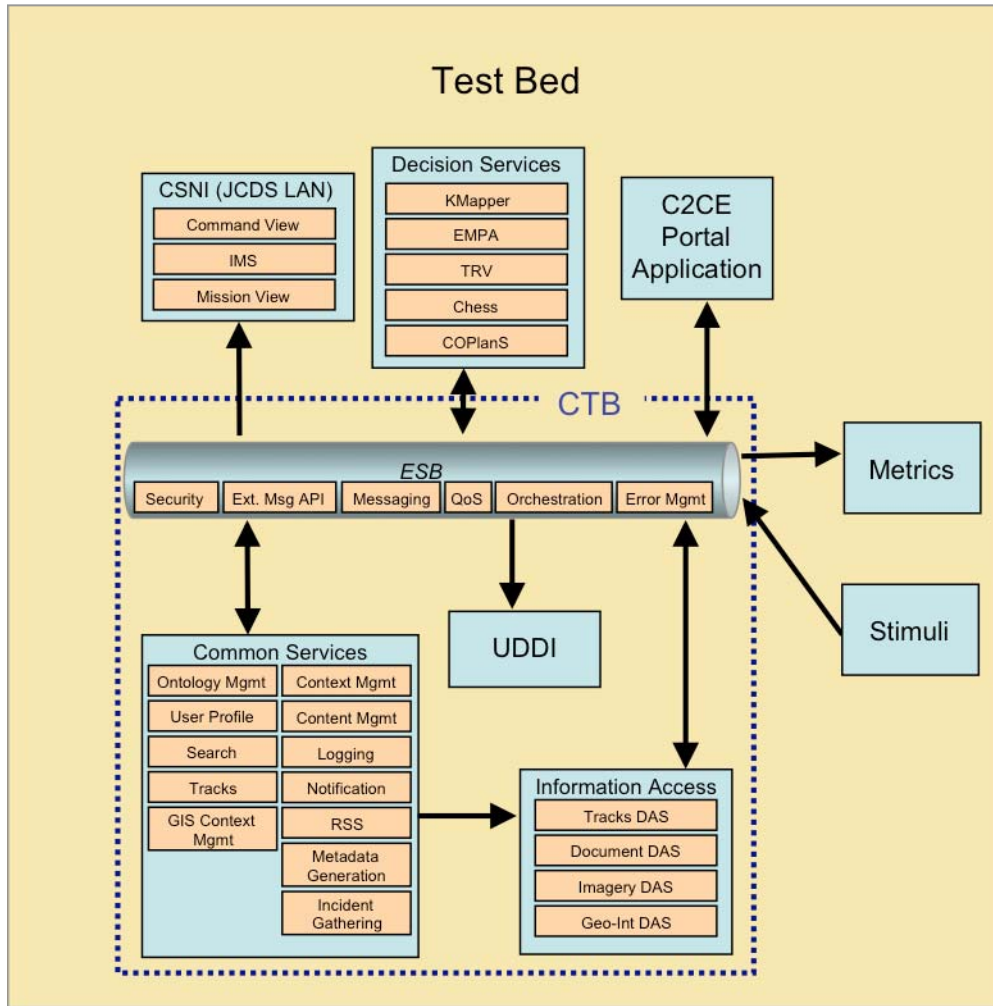


Figure 2 - JCDS 21 TDP Overview

CHESS originated from a research project (Identification of Requirements Related to the Use of a Wireless Handheld Tool for a Commander),⁵ where the initial goal was to investigate functional and system requirements related to the use of a Commander’s pocket support device (e.g. pocket PC) for

⁵ [SOW] Identification of Requirements Related to the Use of a Wireless Handheld Tool for a Commander, W7701-5-4996, RFQ 72864, 2007

planning and monitoring of operations and decision support. A first proof-of-concept mock-up was developed in conjunction with a comparative study that covered an overview of the most recognized and/or promising technologies (both hardware and software) available on the market in the mobile device domain. At the time the study was completed, the two most important mobile platforms were RIM (Research In Motion) BlackBerry and Microsoft Windows Mobile. Based on the status of the technology and the market trends, Windows Mobile was recommended as the best solution to cover as many objectives as possible. Some of the reasons invoked are its interoperability with the Windows desktop environment, the very wide spectrum of applications available on the market to cover various capabilities, and the development flexibility compared to the BlackBerry environment. Apple's iPhone was only briefly covered initially as it simply did not provide all necessary capabilities for a professional environment. This dramatically changed in 2008 with the arrival of Apple's new iPhone 3G and its new Operating System (OS), which have influenced the entire smartphone market.

Some of the objectives targeted for the CHESS project included interoperability with COPlanS to cover various aspects of its capabilities. Other systems that CHESS had to interoperate with included Command View, IMS and EMPA. The interoperability described does not translate into full-blown access to all functions and capabilities in a mobile environment, but in a reduced and lightweight version of specific key functions. Those functions include the ability to download and view various documents (like briefings), the ability to get an updated list of incidents from IMS and locate them on a map, the ability to collaborate on the development of COAs (Courses Of Action), access to plans and consultation of planning status, the ability to store and retrieve emails, manage contacts and appointments and receive email notification about new incidents, the ability to receive and follow a briefing remotely with audio capability, etc. The areas involving reduced functionality concern some functions such as GIS (or mapping) capability that do not natively support dynamic capabilities, forcing the use of static maps. Another example is the reception of briefings remotely and the ability to follow them remotely. On a regular desktop computer, a capability such as desktop sharing or "Webex" would be used, but those capabilities are not supported natively in the chosen environments (Windows Mobile and Windows CE).

JCDS21 TDP will demonstrate how wireless handheld technology can be used to allow a Commander to remain engaged in the planning process while retaining the ability to monitor and command current operations while away from his HQ.

3. General System Description

3.1 System Context

The TA15 CHES system boundary is shown in Figure 3 - CHES System Context. CHES interacts with various JCDS 21 CTB services and external systems. As depicted in the following diagram (Figure 3 - CHES System Context), viewed from a high level of abstraction in order to provide a quick overview, CHES is mainly a consumer of data and information from the other systems in the JCDS 21 CTB system context.

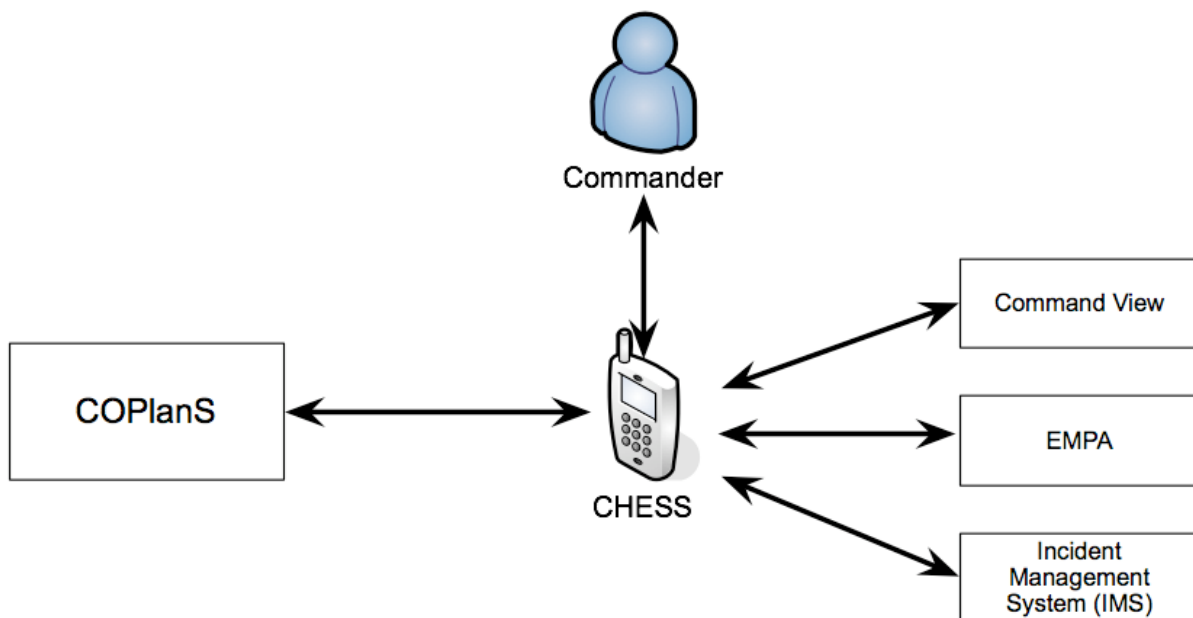


Figure 3 - CHES System Context

3.1.1 Proposed System Interfaces

The proposed system will be capable of interfacing with the three already identified applications, namely “COPlanS”, “Command View” and “IMS”, throughout a message based system for retrieval of content. The volume and diversity of exchanged content may have a considerable impact on the operation of the wireless handled tool because of low bandwidth consideration; this will have to be taken into account. In addition, consideration should be given to provide interface with other Command Support applications such as EMPA and TRV.

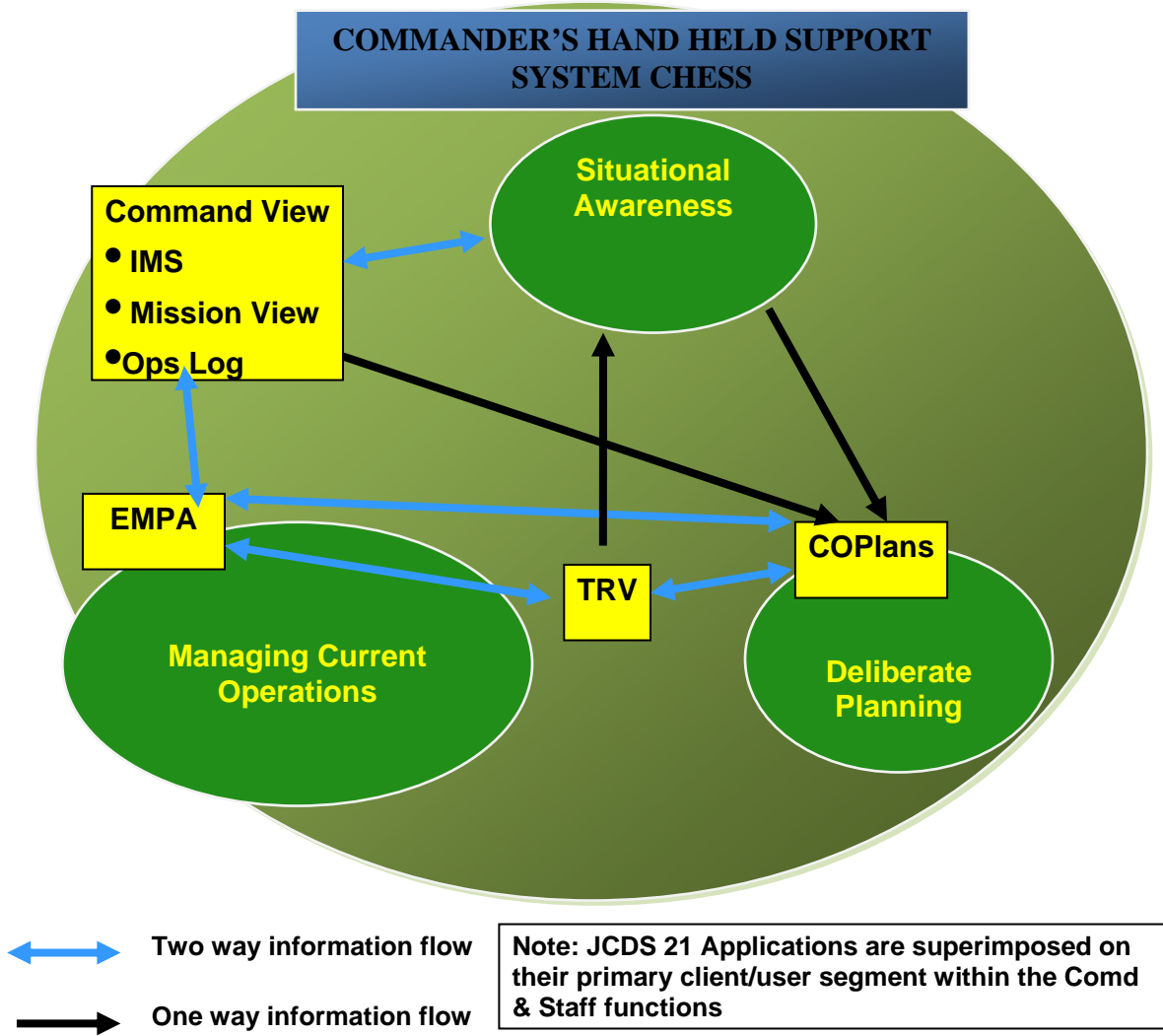


Figure 4 - Conceptual View of the Commander's Handheld Support System (CHESS)

3.1.2 Users

The system developed on this research project targets the Commander. For the purpose of JCDS 21, the *Commander describes the user segment*: considered as the End User that will use the system to receive and send his information, use the software available on the wireless handheld device to gain an understanding of the situation and provide orders and directions. Up to 4 levels of command will be covered as follows in this context, as follows:

- Chief of the Defence Staff and Strategic Joint Staff
- Commander Canada Command or equivalent (CEFCOM, CANOSCOM, CANSOFCOM);
- Commander JTFG (Joint Task Force Games) or equivalent;
- Components Commanders (Air, Land and Maritime).

Users are further described in section 3.7.

3.1.3 External Systems

CHESS is expected to interface and interoperate with potentially a small number of external systems, depicted as systems components that are part of the “JCDS 21 Test Bed Environment” in Figure 5 - CHESS in JCDS 21 Test Bed Environment.

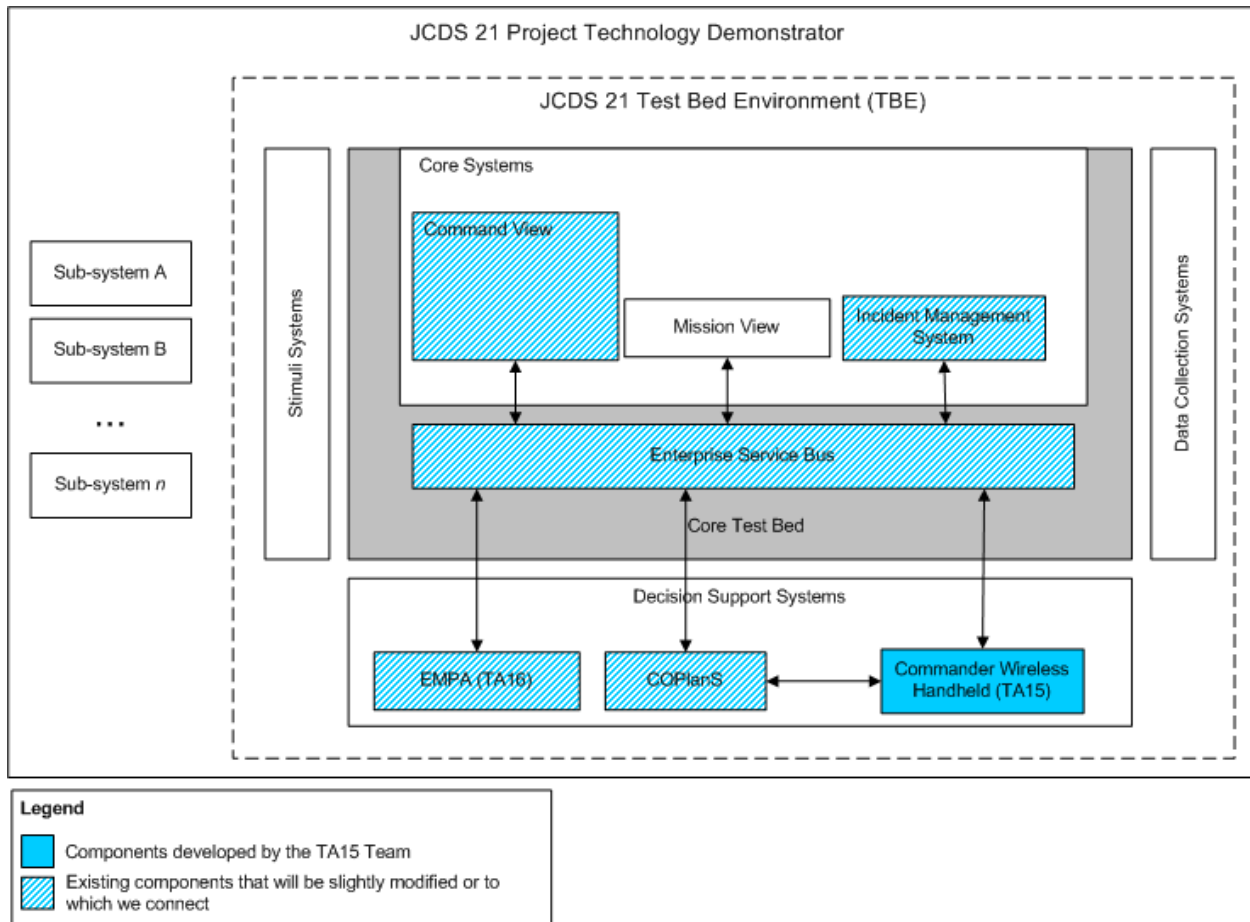


Figure 5 - CHESS in JCDS 21 Test Bed Environment

These external systems have been categorized according to the system functions they enable and perform:

- Core System.** This component represents the system under test (SUT) for a particular experiment. This system results from the combination of components and services from current and future baselines of operational systems and services and components that have been developed for the JCDS 21 TD project.

- **Decision Support Systems.** This component represents the system that will host all the add-ons to be developed for the JCDS 21 TD project to demonstrate collaborative work, distributed situation enablers and actionable knowledge support tools. This is the category where CHESSE sits.
- **Test Bed Stimuli System.** This component represents the system that generates stimuli for a particular experiment. It will be used to support experimentation as well as the demonstration and evaluation of any number of components or services.
- **Test Bed Data Collection System.** This component represents the system that collects metrics and systems behavior values for a particular experiment. It will allow the technical team and scientists to perform data collection, analyze metrics and assess components behavior.

3.1.4 Interactions

The following table summarizes the services exchanged between CHESSE and the system components in Figure 5 - CHESSE in JCDS 21 Test Bed Environment.

Table 2 - CHESSE in JCDS 21 TBE and Component Services Exchanged

Assoc	Components	Description of Services
S1	JCDS 21 TBE	<ul style="list-style-type: none"> • Development environment • System integration and test environment • CTB target deployment environment
S2	JCDS 21 CTB	<ul style="list-style-type: none"> • Baseline environment for the JCDS 21 TDP where all applications and systems will connect
S3	ESB (Enterprise Service Bus)	<ul style="list-style-type: none"> • Information exchange between CHESSE and Command View • Information exchange between CHESSE and IMS • Information exchange between CHESSE and EMPA
S4	Command View	<ul style="list-style-type: none"> • Provides baseline information at strategic and operational level
S5	IMS (Incident Management System)	<ul style="list-style-type: none"> • Incidents list • Incidents map • Incidents details
S6	Decision Support System	<ul style="list-style-type: none"> • Decision Support System interfaces
S7	COPlanS	<ul style="list-style-type: none"> • Campaign list • Campaign plans • Plan • Plan stages (Initiation, Orientation, COA Development) • Plan CCIR's • Plan Risks
S8	EMPA	<ul style="list-style-type: none"> • Provides operations information, plan execution status
S9	CHESSE (TA15)	<ul style="list-style-type: none"> • Mobile Decision Aid System for Commanders

Assoc	Components	Description of Services
S10	Test Bed Stimuli System	<ul style="list-style-type: none"> Test Bed Stimuli System interfaces
S11	Test Bed Data Collection System	<ul style="list-style-type: none"> Test Bed Data Collection interfaces

3.2 Information Requirements

The following types and source of information represent the information requirements for a Commander in a mobile and/or wireless environment that must be considered for integration with CHES

3.2.1 Required Information Sources.

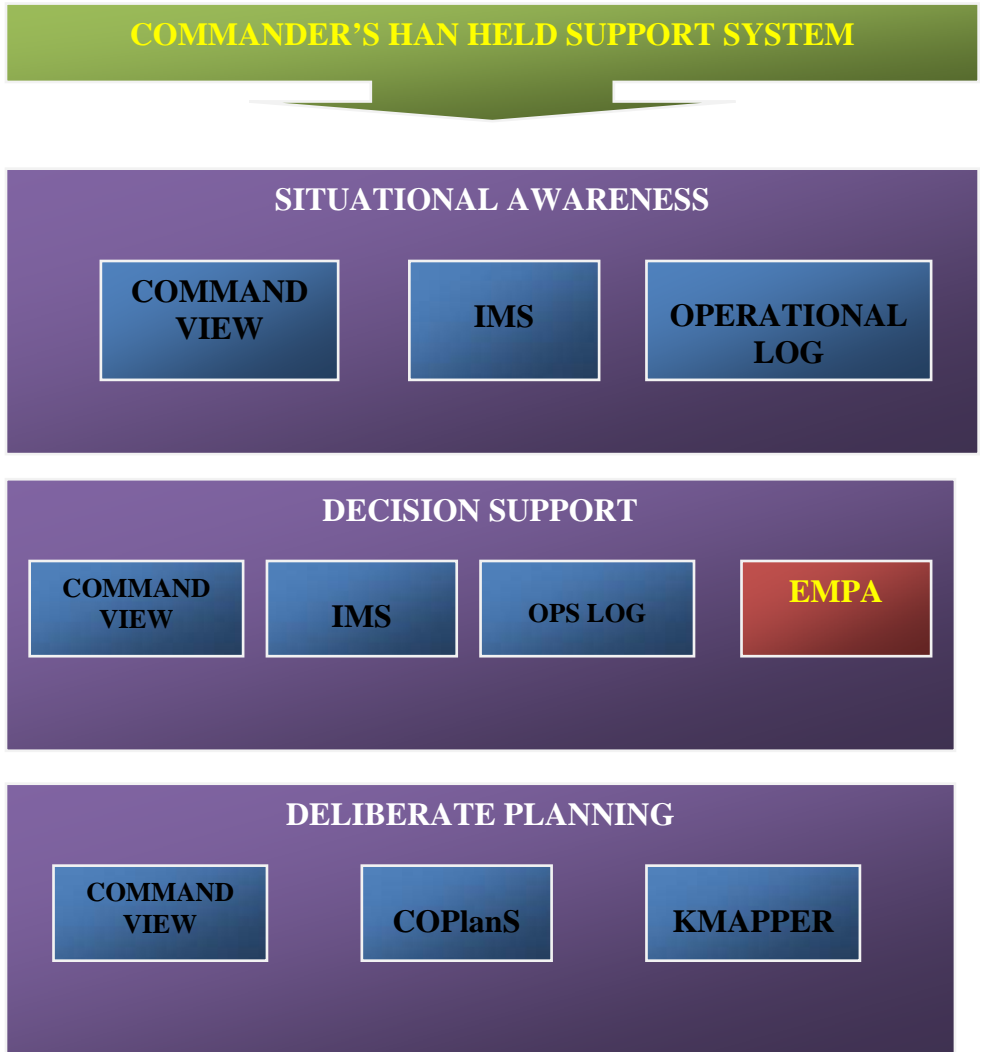


Figure 6 - CHES Required Information Sources Diagram

3.2.2 Information Requirements Matrix

This next segment will take each of the information sources identified in the graphic above and map out what specific information products will be required via the Commander's Hand Held Support. The matrix will identify the information product to be accessed for what purpose, frequency of access or interaction and finally the type of interaction the Commander is required to make with or regarding with each specific information product.

3.2.2.1 Baseline Situational Awareness Information Requirements Matrix

This matrix outlines the type of products Commanders (Based on Commander CANADA COM), would need to access, how frequently and to what degree they would have to interact with each application in order to maintain there baseline Situational Awareness:

Table 3 - Baseline Situational Awareness Information Requirements Matrix

Info Source	Information Product	Frequency	Commander's Interaction
Command View	From Strategic Level: 1. CDS Morning brief 2. CDS Wkly ops brief 3. Key personnel locator 4. Continental highlights 5. International highlights 6. SOF highlights 7. Key issues 8. CF Personnel Summary 9. Upcoming Events 10. Weather 11. News Clips 12. Early Bird 13. Afghan Daily	Mixture of daily and weekly	Mostly read only May want to send comments back either to own Staff of CDS
	From Canada COM: 1. Canada COM Morning Brief 2. Key personnel locator 3. Upcoming Events 4. Weather 5. News Clips 6. Early Bird 7. SAR Report 8. Readiness Status 9. JTF Comd Daily Reports 10. PSC Daily Brief	All daily products	Mostly read May be involved in the review of the daily brief if a sensitive issue is to be dealt with Requires ability to interact with Staff or via voice or chat Requires ability to communicate with

			subordinate Commanders via chat, email or voice to discuss items from their respective daily reports
	Notification Scroll bar and alert	Near real time on going notification of key events	Commanders must continue to receive the notification of incidents and events currently available via Command View
Ops Log	Access to the ops Log	The Commander may be required to access the Ops Log but this will be a rare occurrence	Ideally the Commander should have full access but could be limited to read only

3.2.2.2 Incident Specific Situational Awareness

This matrix outlines the type of products Commanders (Based on Commander CANADA COM) would need to access, how frequently and to what degree they would have to interact with each application in order to maintain is Incident Specific Situational Awareness. The most critical element here is that of notification. The ability to notify the Commander that an incident is emerging or occurring is paramount. Therefore to avoid building in the system a single point of failure several means should be available via the Commander's CHESSP to notify or Alert him. In addition to the information listed under the Baseline SA the Commander will need access to the following:

Table 4 - Incident Specific Situational Awareness Matrix

Info Source	Information Product	Frequency	Commander's Interaction
Command View	Notification Scroll bar and alert	Near real time on going notification of key events	Commanders must continue to receive the notification of incidents and events currently available via Command View
IMS	Access an Incident page or Exercise page	As required when events or exercises are created	Commander will require access to all the functionalities offered by the IMS
Ops Log	Access to the ops Log	The Commander may be required to	Ideally the Commander should have full access

		access the Ops Log but this will be a rare occurrence	but could be limited to read only
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3.2.2.3 Decision Support Information.

This matrix outlines the type of products Commanders (Based on Commander CANADA COM) would need to access, how frequently and to what degree they would have to interact with each application in order to remain involved in the decision making process during an incident or an operation regardless of where they are located. Commanders, depending on their personal preference or based on their location have the option to delegate their authority to an Acting Commander. The use of the Commander's CHES assumes that he has not delegated that authority and remains fully involved in the decision making process. The most critical element is for the commander to receive the most up to date information and remain in touch with his Superiors, his Staff, Subordinate Commanders and OGD Partners. The Commander must remain an active participant in the decision-making process he will require access to all the applications listed above plus those listed below. In addition I felt important to add EMPA. Once fielded EMPA will allow the Commander to monitor the progress of a given operation and remain involved in the process of amending the plan to achieve mission success including contribution to hasty planning, cycles, review and approval of fragmentary orders (Frag O) or other instructions:

Table 5 - Decision Support Information Matrix

Info Source	Information Product	Frequency	Commander's Interaction
Command View	COP Joint, JTFA and Army, Navy and Air specific to the ongoing operation (AFCIS, MCOIN, LFC2IS)	As required	Commander must be able to view the COP via these C2IS applications. Could be screen captures initially but eventually the near real time picture would be required
	Mission View	As required	Commander may have to access keystone documents such as plans, ROE, Strategic Guidance before making changes to a plan within the context of an on going operation
IMS	Access an Incident page or Exercise page	As required when events or exercises are created	Commander will require access to all the functionalities offered by the IMS
Ops Log	Access to the ops Log	The	Ideally the Commander

		Commander may be required to access the Ops Log but this will be a rare occurrence	should have full access but could be limited to read only
EMPA	Once deployed Commander would require access to the plan monitoring function and tools available to adjust the plan	As required based on events	Commander would be required to contribute to hasty planning sessions in a collaborative environment or by viewing products on Pocket PC and interacting with Staff or other Commanders via chat or voice

3.2.2.4 Deliberate Planning.

This matrix outlines the type of products Commanders (Based on Commander CANADA COM) would need to access, how frequently and to what degree they would have to interact with each application in order to remain involved in the deliberate planning process and decision making associated with the planning process. Typically, the Operational Planning Process at the Operational Level occurs over longer period of time leading to the producing of contingency Plans or operational Plans. Contrary to the planning and decision making process associated with an incident or on going operation, these activities are not time sensitive. The Commander would most likely have time to return to his Headquarters to be involved in the planning. However, this can change rapidly in the case of a rapidly emerging situation when the timelines to complete a plan can be compressed significantly. Under these circumstances the Commander will have to be involved in the process to the full extend possible regardless of where he is located. In addition to the information listed in the previous three matrices he will require access to the following applications that specifically support the planning process:

Table 6 - Deliberate Planning Matrix

Info Source	Information Product	Frequency	Commander's Interaction
Command View	Mission View	As required	Commander may have to access keystone documents such as plans, ROE, Strategic Guidance throughout the planning process
COPlanS	Initiation Module	Upon receipt of an Initiating Directive or Warning Order from CDS or SJS	Commander must be read and interact with the documents received from higher. Ability to extract key elements and import them into his

			Commanders Planning Guidance
	Orientation	In accordance with the Planning Battle Rhythm created in COPlanS within the timeframe allocated by the higher HQ	<p>Full access to COPlanS in order to:</p> <ul style="list-style-type: none"> Conduct Mission Analysis Develop own Mission Statement Fine tune CPG Access and participate in the Mission Analysis Brief Issue Guidance to the Staff including Concept of Operation Develop an issue a Warning Order to Subordinate Commanders
	COA Development	As required but most likely only once to receive the Decision Brief	<p>Commander may be required to answer questions from the Staff via Email, Chat or voice</p> <p>Commander must have access to the Decision Brief produced by the Staff</p> <p>Commander must have the capability to actively participate in the decision brief to provide guidance to Staff</p> <p>Commander must be able to select COA, provide additional guidance and articulate an CONOPs</p>
	Plan Development	As required	<p>Commander is generally not involved unless his staff needs to confirm elements of the plan with him</p> <p>Commander may be required to consult his superior to discuss aspects of the plan or seek clarification</p>
	Plan Review	In accordance with the Planning Battle Rhythm created in COPlanS within the	<p>Commander must be able to access the plan in order to:</p> <ul style="list-style-type: none"> Review the plan

		<p>timeframe allocated by the higher HQ</p>	<p>Make changes to the plan</p> <p>Approve the plan and authorize its release as an Order</p> <p>Need mechanism to formalize his approval</p> <p>Commander may have to back brief higher or OGD partners on his plan. This may include</p> <p>Providing guidance to Staff to prepare a Briefing</p> <p>Reviewing and approving the briefing</p> <p>Could include conducting the briefing from a remote location</p>
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3.3 Major Technology Capabilities

Before the system capabilities planned for CHESS are looked at, the “Technology Development, Integration and Test Capability” must first be examined. This becomes especially relevant when taking into account the use of new communication protocols and new hardware technologies that both directly influence the software developed.

3.3.1 Overview

In the context of the TA15, two major technologies were to be taken into account for all development efforts. There is the Windows Mobile based device, as per the recommendation in the first project comparative study. Then there is the secure mobile device, as per the “Canadian Cryptographic Modernization Project” choice and specifications. The Windows Mobile based device refers to the HTC TyTN, described in detail in the TA15 SARAD.⁶ The secure mobile device referred to on the TA15 project is the Sectera Edge⁷ from General Dynamics.

3.3.1.1 SME PED (Secure Mobile Environment Portable Electronic Device)

This technology is based on the work from the “Canadian Cryptographic Modernization Project”. The technology originated from a contract awarded by the NSA (National Security Agency) to L-3 Communications and General Dynamics C4 Systems. The contract goal was to develop the next-generation of portable encrypted communication devices.

⁶ **FUJITSU Consulting (Canada)**, *Commander Wireless Handheld Prototype System Development – System Architecture & Requirements Allocation Description (SARAD)*, January 2009, W7701-05-3182, Task Authorization TA15, page 33.

⁷ **General Dynamics C4 Systems**, Sectera® Edge™ - Secure Mobile Environment Portable Electronic Device (SME PED), <http://www.gdc4s.com/content/detail.cfm?item=32640fd9-0213-4330-a742-55106fbaff32&page=1>

Due to the classification of the information and the networks involved, there are numerous limitations to take into account from a software development point of view.

The first identified SME PED was the General Dynamics Sectera Edge. For various reasons, the hardware was never available for the TA15.

The second device was the L-3 Guardian[®], which became available for testing for the first JCDS 21 experiment held in Ottawa.

3.3.1.2 Windows Mobile based smartphone

This technology is one of the main competitors currently on the smartphone market. The choice is based on the conclusions and recommendations from the initial “Wireless Handheld” project. The platform provides countless capabilities with the hardware now available. All development and testing is done on this technology with one condition: limit development to SME PED specifications and constraints to maximize migration and/or interoperability.

3.4 Major System Capabilities

The following table provides a list of all functions requested in the Statement Of Work (SOW) for TA15.⁸

Table 7 - CHESS Function Descriptions and Priority List

ID	Product/Function Name	Mandatory/Optional	General Description
2.6.1	Functions to access Situational Awareness	Mandatory	Situational Awareness (past, present and even predicted) will be accessible from the heterogeneous data streams (audio, speech, text, video, maps, etc.) through different access means supported by the device and provided by JCDS 21 Test Bed systems, mainly CommandView.
2.6.2	Personal Information Manager (PIM)	Mandatory	Ability to store and retrieve e-mail, manage contacts and appointments (outlook functionality)
2.6.3	Access to COPlanS plans	Mandatory	Access to plans and consultation of planning status via a Web-based interface to COPlanS Continuous engagement in the planning process
2.6.4	Notification	Mandatory (email) / Optional (other protocols)	Reception of notifications events related to current plan through emails or other specialized transmission protocols
2.6.5	Collaborative Planning	Mandatory	Collaboration with planning staff to activate planning stages or transit from one stage to the next via a Web-based interface to COPlanS. This must include the ability to review outputs of the planning process at each stage of the OPP
2.6.6	Chat	Optional	Text-based online chat communication over the Internet (direct one-on-one or to a group)

⁸ **RDDC Valcartier**, *Statement of Work - Commander wireless handheld prototype system development*, February 2008, W7701-05-3182, Task Authorization TA15, 10 pages.

ID	Product/Function Name	Mandatory/Optional	General Description
2.6.7	Planning Guidance	Mandatory	Contribution to planning by giving guidance or by inserting information or concerns about any aspects of the plan
2.6.8	Document Approval	Mandatory	Ability to approve documents in particular plans and orders
2.6.9	Voice communications over briefings	Mandatory	Ability of audio intervention during a remote briefing
2.6.10	Audio Video Conferencing (or Web-conferencing)	Optional	Reception of briefings remotely (automatic run of slides on device screen with audio of presentation), depending on current capabilities of technology
2.6.11	EMPA (Execution Management and Plan Adaptation)	Mandatory	Retrieval and monitoring of operations status

Each identification number (ID) is based on a direct reference to the SOW from DRDC and the Technical Proposal⁹ from Fujitsu.

3.4.1 Overview

As shown in Table 7, CHESS will provide 11 main system capabilities, ranging from audio communications, briefing visualization, situational awareness, to planning collaboration. These main system capabilities are further described in the paragraphs below.

3.4.1.1 Functions for accessing Situational Awareness Tools

This major system capability will enable:

- Access to Command View briefings and other important documents;
- Access to the incident list and details via IMS;
- Access to maps with georeferenced operations or incidents;
- Ability to monitor plan execution and operations status via EMPA and other legacy C2 applications.

3.4.1.2 Personal Information Manager (PIM)

This major system capability will make it possible to:

- Manage and synchronize contacts;
- Manage and synchronize the appointment schedule, calendar and meetings;
- Manage and synchronize tasks;
- Send and receive email messages.

⁹ **FUJITSU Consulting (Canada)**, *Proposal - Commander Wireless Handheld Prototype System Development*, 4 April 2008, W7701-05-3182, Task Authorization TA15, 18 pages.

3.4.1.3 Participate in Planning Process

This major system capability will make it possible to:

- Monitor progress of planning cycles and associated key deliverables ;
- Access and control planning battle rhythm;
- Participate in COA development as required or review the output of the COA Development stage of the OPP
- Access and/or add Commander Critical Information Requirements (CCIR);
- Consult the threats list;
- View and review the outputs of the planning process
- Contribute to the planning process by having the ability to:
 - Complete missions analysis
 - Craft a proposed mission statement
 - Prepare and distribute Planning Guidance
 - Draft a Concept of Operations and its associated Commander's Intent paragraph

3.4.1.4 Notification

This major system capability will make it possible to:

- Receive notifications related to the status of on-going planning activity via email;
- Receive notifications related to new incidents via email.
- Receive notification on mission success criteria
- Receive notification on decision points and associated triggers
- Receive notification of availability of key planning products

3.4.1.5 Chat

This major system capability will enable:

- Text-based chat with other planning personnel.
- Text-based chat with subordinate commanders
- Text-based chat with current operations staff
- Text-based chat with superior commanders

3.4.1.6 Documents Approval

This major system capability will make it possible to:

- Review and approve key documents in particular orders of different formats.

3.4.1.7 Voice communications over briefings

This major system capability will make it possible to:

- Conduct audio conversations while viewing briefing documents.

3.4.1.8 Audio Video Conferencing (or Web-conferencing)

This major system capability will make it possible to:

- Receive a full briefing presentation remotely (automatic run of slides remotely controlled by presenter).

3.5 Major System Conditions

The use of wireless handheld devices must be authorized on the premises, including communicating over Wi-Fi and/or cellular networks. The data transmitted must not be of a classified nature unless used on a certified device such as a SME PED.

3.6 Major System Constraints

There are multiple constraints to take into account for the TA15 project. The most important remain the hardware and networking categories. That is mainly due to the nature of the information required and used on the project versus the communication protocols used (wireless communications).

The specific system constraints for CHESS major system capability are specified in its respective section: 4.3.2.

3.7 User Characteristics

3.7.1 Commander

The system developed on this research project targets the Commander; however it is understood that other user segments may have a requirement for this capability in the future. For the purpose of JCDS 21, the *Commander describes the user segment*: considered as the End User that will use the system to receive and send his information, use the software available on the wireless handheld tool to gain an understanding of the situation and provide orders and directions. The term “Commander” can refer to the various levels of Commanders as well as “Second In Command (2IC)/Deputy Commander, Chief of Staff, Staff Principles (J1, J2, J3 etc) and specialist officers.

A more detailed description of the various users should be completed once research and interviews with the various potential users (Commanders) are identified and defined, with respect to the nature of their work.

3.8 Assumptions and Dependencies

The primary assumptions made during the development of this document were as follows:

- The development focus will be based on the conclusions and recommendations from the previous “Wireless Handheld” project.¹⁰

¹⁰ **FUJITSU Consulting (Canada)**, *Identification of Requirements related to the use of a Wireless Handheld Tool for a Commander – Final Report*, January 2008, W7701-5-4996, RFQ 72864, 85 pages.

- The main effort for the JCDS 21 TDP is to provide support to JTFG and associated Vancouver 2010 Olympics activities.
- The JCDS 21 TDP Experiment 2, further described in Section 4.1.1, will be the validation gateway for deliverables being proposed for use during the Vancouver 2010 Olympics.
- CF and associated Vancouver Olympics 2010 stakeholders are receptive to JCDS 21 TDP deliverables.
- DRDC and CF stakeholders will support JCDS 21 TDP deliverables as required to ensure that they are relevant and available for the Vancouver 2010 Olympics. This includes any acceptance testing, validation testing, certification and accreditation processes, field trials, user training and support requirements leading up to operational use.

The primary dependencies associated with the JCDS 21 Core Test Bed System Requirements Specification are as follows:

- Specifications, limitations and constraints from the “Canadian Cryptographic Modernization Project” are to be respected throughout development since the intent is to test the CHESS solution on the SME PED (Secure Mobile Environment Portable Electronic Device).
- Availability of the SME PED will be key to testing the solution on a secure wireless handheld device.
- Definition and stability of the requirements associated with command decision support for the Vancouver 2010 Olympics.
- Scope, objectives and schedule for JCDS 21 TDP Experiment 2.
- ADM(IM) certification and accreditation process and timeline. This dependency is critical given the typically long delay involved.
- “Baseline freeze” date associated with any operational system being used by JTFG for the Vancouver 2010 Olympics.
- Operational planning and synchronization of JCDS 21 TDP with JTFG and associated organizations leading up to Vancouver 2010 Olympics.

4. Systems Capability

4.1.1 Overview

The CHESS capabilities are mostly based on Web services that communicate via BEA WebLogic on the JCDS 21 CTB in order to fetch the filtered information and adapt its presentation before it is displayed on the wireless handheld device.

Throughout all subsequent sections under Section 4, the requirements will be presented in a table comprising four fields to be filled.

Table 8 - Requirement Table Example

JCDS 21 CHESS 1			
Target Delivery:		Priority:	
Verification Method:			

The first field (top), contains the description of the requirement. The second field (middle left) provides the target release, which can be either Experiment 1 or Experiment 2. Experiment 1 represents the JCDS 21 TDP final demonstration and experiment that was held in Ottawa (Ontario) from October 20 to 24, 2008. Experiment 2 represents the JCDS 21 TDP participation in Major Events Coordinated Security Solutions (MECSS) during the Exercise Bronze and Pegasus Guardian II held in Vancouver (British Columbia) from November 5 to 18, 2008. The next field (middle right) represents the priority of the requirement described. The priority can range from “Low” to “Medium” or “High”. The last field (bottom) provides the method used to validate the described requirement.

The system capabilities for the functions made available on CHESS are described in the paragraphs below.

4.2 System Capabilities

4.2.1 Functions for accessing Situational Awareness

JCDS 21 CHESS 1 Access situational awareness information (past, present and predicted future) through audio data streams.			
Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 2 Access situational awareness information (past, present and predicted future) through speech data streams.			
Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 3 Access situational awareness information (past, present and predicted future) through text data streams.			
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Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 4 Access situational awareness information (past, present and predicted future) through video data streams.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 5 Access situational awareness information (past, present and predicted future) through graphics data streams.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 6 Access key sources of information related to current situation available in Command View system identified as key for the CHESS user.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 7 Access list of incidents reported in Incident Management System identified as key for the CHESS user.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 8 Access detailed information on an incident of interest reported in Incident Management System.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 9 Access a graphical georeferenced position of an incident of interest reported in Incident Management System.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 10 Ability to monitor plan execution or operations status.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

4.2.2 Personal Information Manager (PIM)

JCDS 21 CHESS 11 Device enables users to store and retrieve e-mail.			
Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 12 Device enables users to store and retrieve contacts.			
Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 13 Device enables users to store and retrieve appointments.			
Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 14 Device enables users to store and retrieve tasks.			
Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

4.2.3 Access and participate to the Planning Process

JCDS 21 CHESS 15 Access contingency plans developed and available in COPlanS system and identified as being of interest for the CHESS user.			
Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 16 Access future, current and past plans developed and available in COPlanS system and identified as being of interest for the CHESS user.			
Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 17 Participate in various planning stages by giving directives and guidelines to be available in real time in COPlanS system for planning staff.			
Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 18 Generate and submit orders using COPlanS system data and automated generation services.			
Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 19 Access and/or add Commander Critical Information Requirement (CCIR) managed by COPlanS system.

Target Delivery: Experiment 1 **Priority:** High

Verification Method:

JCDS 21 CHESS 20 Access threats list managed by COPlanS system.

Target Delivery: Experiment 1 **Priority:** High

Verification Method:

JCDS 21 CHESS 21 Access and control planning battle rhythm by interacting with COPlanS planning process workflow manager.

Target Delivery: Experiment 1 **Priority:** High

Verification Method:

JCDS 21 CHESS 22 Collaborate with Public Sector Partners, Superior and Subordinate Commanders to modify existing plans throughout its execution in order to react or adapt to a dynamic environment via an interface to EMPA or other applications such as IMS, Chat or OPS LOG.

Target Delivery: Experiment 1 **Priority:** High

Verification Method:

JCDS 21 CHESS 23 Ability to send Commander's guidance for COA development in COPlanS.

Target Delivery: Experiment 1 **Priority:** High

Verification Method:

4.2.4 Notification

JCDS 21 CHESS 24 Receive notification of events through emails or other specialized transmission protocols to indicate any status change related to planning process that are of interest for CHESS user.

Target Delivery: Experiment 1 **Priority:** High

Verification Method:

JCDS 21 CHESS 25 Receive notification of events through emails or other specialized transmission protocols to indicate any status change related to current operations that are of interest for CHESS user.

Target Delivery: Experiment 1 **Priority:** High

Verification Method:

JCDS 21 CHESS 26 Receive notifications events through emails or other specialized transmission protocols to indicate new incident any incident status that are of interest for the CHESS user.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

4.2.5 Chat

JCDS 21 CHESS 27 Text-based online chat communication (direct one-on-one or to a group) with key personnel.			
Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 28 Speech-to-text ability (audio comments automatically converted into text for immediate or future transmission through email or chat).			
Target Delivery:		Priority:	Low
Verification Method:			

4.2.6 Documents Approval

JCDS 21 CHESS 29 Approve documents including authentication process.			
Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

4.2.7 Voice communications over briefings

JCDS 21 CHESS 30 Audio intervention ability during a remote briefing.			
Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

4.2.8 Audio Video Conferencing (or Web-conferencing)

JCDS 21 CHESS 31 Receive a briefing remotely (automatic run of slides on device screen with audio of presentation).			
Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

4.3 System Conditions and Constraints

4.3.1 System Conditions

JCDS 21 CHESS 32 The Web services developed must comply with BEA WebLogic 10 for integration in the JCDS 21 TDP environment. Compliance is subject to change if the environment in which CHESS is to be implemented and integrated changes.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 33 All developed services must run on BEA WebLogic in order to facilitate communication with other system services being tested in the JCDS 21 TDP experiments (and exercises).

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 34 The Commander must be able to work collaboratively with Public Sector Partners, Superiors and Subordinate Commanders.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 35 The target deployment environment will require Microsoft Exchange 2003 server or higher in order to fully support all built-in Windows Mobile features.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 36 The Microsoft Exchange 2003 server will need activesync capabilities enabled for email, notification and remote security (remotely wipe device's memory).

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

4.3.2 System Constraints

JCDS 21 CHESS 37 No capabilities or functions can be installed directly on the wireless handheld device in order to maintain SME PED accreditation/certification.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 38 No modifications are allowed to IMS. Development must be limited to what is made available to the user.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

4.4 Computing

4.4.1 Computing Hardware

JCDS 21 CHESS 39 Testing of Windows CE must be achieved via emulator.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 40 All development must be integrated into JCDS 21 CTB.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 41 For general testing purposes, the generic wireless handheld device to be configured should be the following model (or an equivalent): HTC TyTN (Hermes).

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 42 The handheld device must have sufficient storage to hold the operating system, system under test, and data to conduct an experiment.

Target Delivery:	Experiment 1	Priority:	Medium
Verification Method:	Inspection: The verifier must confirm that the system's mobile device has sufficient storage space.		

4.4.2 Networking Hardware

JCDS 21 CHESS 43 The wireless handheld device must support communication via Wi-Fi (IEEE 802.11 b/g) and GSM/GPRS/EDGE networks.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 44 Provide Commanders with access to different communication mechanisms and networks so they can establish and maintain contact between their Staff, Subordinate Commanders and Key Joint, Coalition and Public Sector Partners via devices such as (cell phones, VoIP phone, TCPIP (email, chat, Web)).

Target Delivery:	Experiment 1	Priority:	High
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Verification Method:	
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JCDS 21 CHESS 45 Wi-Fi routers supporting IEEE 802.11 b/g will be required.

Target Delivery:	Experiment 1	Priority:	High
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Verification Method:	
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JCDS 21 CHESS 46 GSM/GPRS/EDGE PBX servers will be required to test capabilities over the cellular network.

Target Delivery:	Experiment 1	Priority:	High
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Verification Method:	
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4.5 System Performance Characteristics

JCDS 21 CHESS 47 To streamline the bandwidth and the information displayed, provide functions to filter, synthesize and compress certain document or information types.

Target Delivery:	Experiment 1	Priority:	High
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Verification Method:	
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JCDS 21 CHESS 48 Provide Commanders with capability to transmit and receive information in an environment with limited bandwidth and unstable connectivity.

Target Delivery:	Experiment 1	Priority:	High
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Verification Method:	
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4.6 System Security

JCDS 21 CHESS 49 Provide Commanders with a means to self-erase (wipe) all content.

Target Delivery:	Experiment 1	Priority:	High
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Verification Method:	
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JCDS 21 CHESS 50 Commanders must be provided access to classified information from UNCLASS to SECRET including open source in a Joint, Combined and Public Sector environment.

Target Delivery:	Experiment 1	Priority:	High
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Verification Method:	
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4.7 Information Management

JCDS 21 CHESS 51 Provide Commanders with the ability to handle, store and view file formats linked to planning (pdf, doc, ppt, jpeg, gif, html, email, zip, etc.).

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

4.8 System Operations

4.8.1 System human Factors

JCDS 21 CHESS 52 All development must comply as much as possible with the requirements described in *JCDS21 TD Human Factors Style Guide*.¹¹

Target Delivery:	Experiment 1	Priority:	High
Verification Method:	Use the device and try every interface on a closed or opened network connecting to the required systems.		

JCDS 21 CHESS 53 All interfaces must be optimized for rendering on small screen displays with a resolution of 320x240 pixels (landscape and/or portrait orientation).

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

JCDS 21 CHESS 54 Provide Commanders with a notification, alarm and inter-application notification via different context-adapted devices to draw his attention to important or time-sensitive information.

Target Delivery:	Experiment 1	Priority:	High
Verification Method:			

4.8.2 System Maintainability

JCDS 21 CHESS 55 All development must be compliant and compatible with Windows CE 5, which is the default operating system on the SME PED.

Target Delivery:	Experiment 2	Priority:	High
Verification Method:			

4.8.3 System Reliability

TBD

¹¹ Kelly Forbes, Michelle Gauthier, Susan McIntyre, *JCDS21 TD Human Factors Style Guide*, Defence R&D Canada – Toronto, April 2008, Page 21, Section 3.3.

4.9 Policy and Regulation

JCDS 21 CHESS 56 The HTC TyTN must be certified and/or approved for use in the JCDS 21 environment.

Target Delivery:	Experiment 1	Priority:	High
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Verification Method:	
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JCDS 21 CHESS 57 The SME PED must be certified SECRET for data communication and TOP SECRET for voice communication.

Target Delivery:	Experiment 1	Priority:	High
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Verification Method:	
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4.10 System Interfaces

JCDS 21 CHESS 58 No software can be installed and/or modified on the SME PED, so development must be done at the server level with all capabilities accessed via the mobile Web browser.

Target Delivery:	Experiment 1	Priority:	High
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Verification Method:	
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JCDS 21 CHESS 59 All Web services developed must be compatible with Internet Explorer 4.0.1, which is the default browser on the SME PED.

Target Delivery:	Experiment 1	Priority:	High
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Verification Method:	
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JCDS 21 CHESS 60 Provide a user identification mechanism to support continuity of the chain of command and maintain its integrity.

Target Delivery:	Experiment 1	Priority:	High
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Verification Method:	
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JCDS 21 CHESS 61 For the device to remain adaptable to future file formats and content, it should accept the transfer of content through email formats and XML based formatted files or messages to provide the flexibility to easily adapt to future file content.

Target Delivery:	Experiment 1	Priority:	High
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Verification Method:	
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5. References

- **DRDC Valcartier**, *Statement of Work - Commander wireless handheld prototype system development*, February 2008, W7701-05-3182, Task Authorization TA15, 10 pages.
- **FUJITSU Consulting (Canada)**, *Proposal - Commander Wireless Handheld Prototype System Development*, 4 April 2008, W7701-05-3182, Task Authorization TA15, 18 pages.
- **FUJITSU Consulting (Canada)**, *Identification of Requirements related to the use of a Wireless Handheld Tool for a Commander – Final Report*, January 2008, W7701-5-4996, RFQ 72864, 85 pages.
- **DRDC Valcartier**, *Statement of Work - Identification of Requirements related to the use of a Wireless Handheld Tool for a Commander*, September 2007, W7701-5-4996, RFQ 72864, 14 pages.
- **FUJITSU Consulting (Canada)**, *Commander Wireless Handheld Prototype System Development – User Guide*, September 2008, W7701-05-3182, Task Authorization TA15, 23 pages.
- **Prolity Corporation, Michael Raz**, *JCDS21 Exercise Communications/Network Plan TA 25 Draft V0.5 19 Sep 08*, September 2008, 23 pages.
- **General Dynamics C4 Systems**, Sectéra® Edge™ - Secure Mobile Environment Portable Electronic Device (SME PED), <http://www.gdc4s.com/content/detail.cfm?item=32640fd9-0213-4330-a742-55106fbaff32&page=1>
- **NXPowerLite**, *NXPowerLite Server Edition – Executive Summary*, Neuxpower, 1 page.
- **Martin Jordan**, *NXPowerLite – Trident Warrior 2007 Experimentation and Results*, SPAWAR, March 2008, 23 pages.
- **FUJITSU Consulting (Canada)**, *Commander Wireless Handheld Prototype System Development – System Architecture & Requirements Allocation Description (SARAD)*, January 2009, W7701-05-3182, Task Authorization TA15, 60 pages.
- **The Institute of Electrical and Electronics Engineers, Inc.**, *IEEE Recommended Practice for Software Requirements Specifications*, IEEE-SA Standards Board, 25 June 1998, 37 pages.
- **Kelly Forbes, Michelle Gauthier, Susan McIntyre**, *JCDS21 TD Human Factors Style Guide*, Defence R&D Canada – Toronto, April 2008, 89 pages.

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Commanders need to be continuously aware of the evolution of the operations under their areas of responsibility in order to provide directions. They also need to know the tempo of their planning staff as well as the evolution of the plans in order to provide guidance as required. Even if, in order to accomplish the different aspects of their work, commanders are often outside of their offices or their command posts, they need to continually have access to information and knowledge related to the current operations and the operations being planned. JCDS21 TDP demonstrated how wireless handheld technology can be used to allow a commander to participate in the planning and the monitoring of operations while being away from his headquarters (HQ).

This document's purpose is to provide specifications for the components that would be required to implement the wireless handheld tools defined in the Statement Of Work (SOW) for their use on the JCDS Test Bed project. This System Requirements Specification (SRS) is a preliminary report that will serve as a foundation for future efforts with regards to wireless technologies. The product, Commander's Handheld Support System (CHESS), is a proof of concept that helped refine the requirements for this type of technology in a military context.

Les commandants ont un besoin continu d'être à l'affût de l'évolution des opérations dans leur zone de responsabilités afin de pouvoir donner leurs directives. Ils ont aussi besoin de connaître le tempo de leur état-major de planification ainsi que l'évolution des plans afin de pouvoir fournir leurs directives au besoin. Même si, afin d'accomplir les différents aspects de leur travail, les commandants sont souvent hors de leur bureau ou de leur poste de commandement, ils doivent continuellement avoir accès à l'information et aux connaissances relatives aux opérations courantes ou en cours de planification. Le « JCDS 21 TDP » a démontré comment la technologie mobile sans-fil peut être utilisée pour permettre à un commandant de participer dans la planification et le suivi des opérations tout en étant hors de son quartier général.

Ce document a pour but de fournir des spécifications sur les composantes qui seraient nécessaires pour l'implémentation des outils mobiles sans-fil, décrits dans l'énoncé des travaux, pour leur utilisation sur le projet « JCDS Test Bed ». Ce « System Requirements Specification (SRS) » est un rapport préliminaire servant de fondation pour d'éventuels efforts en ce qui a trait aux technologies sans-fil. Les diagrammes inclus respectent les normes UML. Le produit, Commander's Handheld Support System (CHESS), est une preuve de concept qui a permis de raffiner les besoins pour ce type de technologie dans un contexte militaire.

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Handheld

Decision Support

Command on the Move

Situation Awareness on the Move

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