GripMMI Conformity Matrix

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Signature:

This document describes the conformity of the GripMMI software version V1.1.1 with the software requirements specified in CAD-SP-CE238-3609-MED_0101.

In the following table:

- ***Reference ID*** refers to the reference ID of the requirement as listed in CAD-SP-CE238-3609-MED_0101.
- ***Description*** provides the text of the requirement.
- ***Compliance Status*** is indicated as:
  - OK – The requirement is purported to be satisfied, subject to CADMOS concurrence.
  - Partially – Certain details of the requirement have not been explicitly met. Disposition is pending discussion with CADMOS.
  - Query – Clarification from the customer is requested.
  - Pending – The requirement has not yet been met, but will be.
  - No – The requirement has not, strictly speaking, been met, but we request a waiver.
  - Agreed – The requirement has not, strictly speaking, been met, but CADMOS agrees to a waiver/deviation.
- ***Release*** refers to the GripMMI release starting from which the requirement has been met.
- ***Comments / Queries*** show additional information and questions regarding each item.

Reference ID	Description	Compliance Status	Release	Comments / Queries
DE_010	GRIP MMI shall fit in a single configurable display.	Partially Agreed	V1.0	The main display is contained in a single window. There is an 'About' dialog in one separate dialog window and the full length of the current step can be displayed in another. The TCP/IP client runs a console window that need not be visible during normal execution.
DE_020	By default GRIP MMI should display the latest data received. It should be possible to scroll the time backward and a button should allow to return to "live" monitoring for strip charts and phase plots (§3.2.1 & §3.2.2). The time range of the "buffer" capability shall be an adjustable parameter of the GRIP MMI .ini file.	Agreed	V1.0	Window span for strip charts is adjustable via le GUI and scrollable. There is a button to return to live monitoring. The TCP/IP client captures packets from EPM and stores them locally in cache files. The size of the cache is limited only by available disk space. The GripMMI GUI uses buffers in active memory to process and graph the data. These are static buffers and thus the size is defined at compile time. They are set large enough to hold 12 hours of continuous recording. Is the problem that the buffers may not be large enough or that they may be too large for the system constraints on the host machine. For the former, 12 hours should be largely sufficient. For the latter, the executable successfully runs on a 2 GB machine, as specified.
SCI_010	GRIP MMI shall display a colour status of each markers visibility. Manipulandum and wrist markers should be together and quickly identifiable that enough markers are visible to allow 3D positioning of these two items.	OK	V1.1.0	In the summary view the visibility of the manipulandum, frame markers and wrist are shown, as well as the availability of real-time packets. In the Visibility view, the visibility of each marker is displayed.
SCI_020	GRIP MMI shall allow picking into a list of parameters to be displayed as strip charts (function of time). (See CAD-SP-CE238-3609-MED_0101 for details).	Agreed	V1.0	Unlike the other parameters in the list, target state and sound state are not sent by GRIP at 20 Hz. Rather, these two states are included in housekeeping packets sent only once per second. Current target and sound state is displayed, but the time history is not. *Manipulandum tangentially velocity is not computed or displayed. The motivation for this part of the requirement was to detect early or late starts when target or sounds change state. Since the latter information are not available, continuous plotting of tangential velocity is not particularly useful.*

SCI_030	A window shall allow to organize the several strip chats in a configurable order, the window should be scrollable if too many parameters are displayed at the same time.	Agreed	V1.1.0	Per comments to the specification by PsyPhy prior to acceptance of the contract, the window is not configurable. The user may, however, choose from a set of preconfigured graph arrangements. Three are currently provided and PsyPhy will implement additional ones on request at no charge during the warranty period.
SCI_040	Strip chart time parameter should be adjustable as well as ordinate when applicable with manual and auto-scale capabilities.	OK	V1.1.0	Time window is adjustable via an on-screen control. Ordinate can be switched between fixed scale or auto-adjusted scale. The fixed values have been chosen to be maximally useful for interpreting the quality of the science data in real time.
SCI_050	GRIP MMI shall display the following phase plot: - Manipulandum position in the sagittal plane (side view) - Manipulandum position in the horizontal plane (top view) - CoP in X and Y. With a parameter allowing to display a circle to circumscribe the acceptable range of values.	Agreed	V1.0	The diameters of the circles in the CoP phase plot are fixed at compile time, but where tested and validated by the PI and other members of the science team.
SCI_060	GRIP MMI shall display permanently the current: - subject ID - running protocol - Task, Step	OK	V1.0	
SCI_070	There shall be a scrollable text window at the bottom of the display showing time-stamped packets such as status or error messages that GRIP might generate. In particular, it is needed to see when exceptions occur, such as a post-hoc test that fails, and the decision taken by the subject (retry, ignore, abandon).	OK	V1.1.0	The status of the script engine is displayed permanently on the screen. The state of the error text message and picture during real-time and post hoc test is presented as pending or active, depending on the script engine state. We are not aware of other messages that are transmitted from DEX to ground. Other indicators may also be observed in the MMI integrated into the EPM laptop software.
SCI_080	GRIP MMI shall allow following science performance progress step by step using the performed science protocol script as an input. It shall appear the two previous steps, the on-going step and the two next steps.	OK	V1.0	

SW_010	GRIP MMI shall use as inputs the GRIP data packet (DEX SOFTWARE INTERFACE CONTROL DOCUMENT).	OK	V1.0	
SW_020	GRIP MMI shall run on EPM HRD workstation. The application should fit current workstation configuration and allow future Operating System upgrade (Windows 7 Pro, 64bits). EPM-HRD current configuration : - Intel core 2 DUO 2,93Ghz - Graphical card : ATI RadeonHD 2400 Pro - Network card : Broadcom netlink Gb configured to 100 Mb/s- Memory : 2 Go - Hard disk : 150 Go - OS : Win XP pro US	OK	V1.1.0	GripMMI has been tested using Parallels Desktop virtual machines configured for 2 GB of memory, with satisfactory performance.
SW_030	GRIP MMI display size shall fit to control room monitor: 1600x1200 pixels GRIP MMI display should fit both 4:3 and 16:9 (1600x1080)screens.	OK	V1.1.0	The main GripMMI window measures 1540 x 1055. It may be expanded or contracted, but this will clip parts of the display.
SW_040	MMI shall connect either to local IPv4-Address / Port or to external Server IPv4-Address / Port e.g. running in OPS-LAN (connected to CCSDS as data provider) or via Internet connected to EPM-TM-Proxy.	OK	V1.0	The connection IP address is configurable on the command line to the TCP/IP client. The desired configuration is set and preserved by editing a DOS batch file used to launch the two components of the GripMMI application.
SW_050	MMI shall save connection settings in configuration file. (e.g. INI-File)	OK	V1.0	All configurable parameters may be set by editing the DOS batch file used to execute the GripMMI application.
SW_060	MMI shall allow secured deletion of all received TM packets to ensure user capability to fulfill ESA data protection policy. (Handling of science data with potential medical applications)	Agreed	n/a	The GripMMI application buffers packets on the local file system. This file system is under CADMOS control. It is useful to archive the buffer files for review of telemetered data between sessions. GripMMI does not provide specific tools to erase the buffers. Rather, it relies on CADMOS to enforce the data protection requirements.
SW_070 A	GRIP MMI shall be updated at each arrival of a GRIP TM packet with data resolution of 20Hz resolution. HK parameter are updated with 1Hz frequency.	OK	V1.0	

SW_070 B	Period when no packet is received should be clearly identified for both real-time status and strip-charts (e.g. change background color to grey)	OK	V1.1.0	The abscissa of strip-chart plots are indicated in seconds. A black bar in the visibility view in the strip-chart display indicates periods where data packets are available. Visibility of the manipulandum, target frame and wrist box are also indicated.
PA_010	The vendor shall provide a conformity matrix to the requirements defined in this document.	OK		This document.
PA_020	The software development cycle shall include the following phases: - software specification - design - coding / unit tests, - validation / acceptance.	OK		
PA_030	Technical meeting with the CNES (milestone) is needed after software specification and validation phase to confirm the work performed during these phases meet the users' needs. It can be done by teleconference.	OK	V1.0	The customer was provided with the v 0.9 prototype of the software and was given ample opportunity to request or suggest modifications. All requests received to date have been accommodated.
PA_040	The specification phase activities consist at least in: - Identifying the needs expressed by the customer on completion of the latter's needs analysis, and then in translating them in terms of the functions to be fulfilled by the software and of interfaces with the outside and among themselves, - details on the sequence of functionality, - details on the constraints (performance, priorities, storage occupancy), - Analysing, according to the needs to be covered, the part of the software which could be re-used for further experiments using GRIP payload (ie GRASP). - Designing a man-machine interface mock-up. This mock-up must show: - the content of the screen, The output elements of the specification phase shall be described in a software specification document.	Agreed		The customer received the v 0.9 prototype which was used during experiment sequence testing.

PA_050	Future users must participate in the validation of the man-machine interface mock-up (software specification phase milestone).	OK		End users were able to test the v 0.9 prototype during experiment sequence testing.
PA_060	The design activity consists at least in: - defining the structural breakdown of the application into software constituents, and in detailing each one of them, - defining the data flow and the interfaces. - evaluating resources (core memory, mass storage, CPU, peripheral equipment...). The output elements of the design phase shall be described in a design document.	Agreed		These steps were followed during software development. The design document is pending.
PA_070	The coding and unit test activities are: - the coding of the constituents, - the performance of unit tests on the constituents - the integration tests between constituents.	OK		
PA_080	The activities in the validation phase consist in conducting the test plans in order to check that the software fulfills its specified functions.	Agreed		PsyPhy Consulting has validated the software in-house using simulated data packets. CADMOS will implement a test plan for final acceptance.
PA_090	Prior testing, the application executable will be generated at CADMOS based on source code provided by the developer. The validation tests must cover all the software specification requirements.	Pending		Version 1.0 was successfully installed. Testing on version 1.1.1 is pending.
PA_100	The validation tests must be performed on stable software whose version is registered by configuration management. Any modification of the configuration during the validation phase must be recorded.	OK	V1.0	Configuration management is assured with the GIT tool. The archive can be maintained locally, if desired, but is also published at https://github.com/PsyPhy/GripMMI.
PA_110	The validation phase at CNES is preceded by a Test Readiness Review board (TRR) and closed by a Post Test Review (PTR). After this meeting, all the updated documentation must be accepted by the CNES.	Agreed		To be agreed with CADMOS.

CONF_010	The software constituents shall be coded in an advanced programming language with software development environment to be accepted by CNES before the beginning of the coding activity.	OK	V1.0	The entire application is coded in Visual Studio 2010 Express, per agreement with CADMOS.
CONF_020	The vendor shall deliver all the configuration elements of each software Configuration Items. The configuration elements of software Configuration Item is the organized set of: - source elements specific to this Item and from which this Item is produced or described (source files, generation and assembly procedures, design and operating documentation, etc.), - specific means necessary to produce, test or operate it, - references of the non-specific elements necessary to construct or produce the operable item.	OK	V1.1.0	Custom generated software is provided as a set of Visual Studio 2010 Express projects in the directory " GripMMI (Visual C++ 2010 Express)". A full set of project and source files is delivered with each release. Components from third parties that must be installed (e.g. Microsoft runtime libraries and Visual Studio 2010 Express) are provided in the directory "GripInstallItems" with each release. Configuration settings that diverge from the default settings are noted in the file "GripMMI VC++ 2010 Express Configuration Notes.rtf". Instruction for installing on machines for either development and compilation or for run time only are provided in "GripMMI Generation and Installation Instructions.rtf".
CONF_030	CNES will be proprietary of the software source code and will use them if necessary.	Agreed	V1.0	Per agreement, libraries existing prior to the start of the contract (PsyPhy2DGraphics, Useful and Grip) remain the property of PsyPhy Consulting. The customer is granted license for all non-commercial uses. Code developed specifically for the GripMMI software remains the property of the CNES.

CONF_040	The delivery shall include a Configuration Description File containing: - Configuration Item identity information (title, role, producing company, version, reference version, etc.) - Modifications made in comparison to the previous version - Anomalies and change requests status - List of files contained in the delivery with checksum md5 list (source files, files in the installable product, files / modules on the operating site, etc...) - List and applicable version of the reference/delivered documents - Means required for developing / generating / operating (Inventory (name, version, supplier, and role) of the hardware and software means necessary (operating system, compilers, libraries, packages...). -Detailed generating instructions (How to recover, from the delivered media, the delivered elements, to generate what is necessary (binaries, documents...), to obtain software ready to be installed, customized and used (in compliance with the Installation Manual)	Agreed		Configuration Description File is pending. Tracking of modifications is achieved through the automated GIT system, which is the reference. To avoid discrepancies, modifications are not tracked separately in the configuration description file. Anomalies, change requests and status are tracked on-line at https://github.com/PsyPhy/GripMMI in the 'Issues' section. Procedures for generating new versions are described in "GripMMI Generation and Installation Instructions.rtf".
CONF_050	The vendor shall deliver all the software with a compressed file .zip. The name of the file shall contain the name of the configuration item and its specific version.	OK		Software is delivered as .zip archives containing all necessary elements to generate a new release from scratch.
CONF_060	All executable binaries shall be able to display their name and version.	OK		

CONF_070	The generating procedure shall describe at least the following parameters: - the root directory of the sources files, - the directory with required libraries, - the version of the product to be generated, - the main compilation option that could be adjusted. - the list of expected outputs (path, file, size, checksum) - the list of acceptable warnings.	Agreed		Each release is furnished as a full set of configured Visual Studio projects. The file "GripMMI Generation and Installation Instructions.rtf" indicates the directory and root file for the Visual Studio 'solution' and any non-standard compiler options are listed in "GripMMI VC++ 2010 Express Configuration Notes.rtf". As all dependencies and outputs can be obtained by opening and examining the projects within the Visual Studio solution explorer, no further documentation of output files is provided.
CONF_080	The installation procedure shall control the following tasks: - Unzip and control the element to be installed (for huge software), - Create directories and files necessary for the use of the software - Adjust environment variables and access rights, - Purge obsolete files. - Run at the end a fingerprint of the installed product,	OK		"GripMMI Generation and Installation Instructions.rtf" indicates all the steps to perform an installation for development purposes or for run-time only purposes.
CONF_090	The installation procedure shall cover the installation from scratch or from a previous version.	OK		
CONF_100	The self-documentation rules intrinsic to the programming language (ex: comments that can be used by javadoc for the Java language) must be applied.	OK		The self-documentation rules are ill-defined for C++. Comments in a particular format will be added if specifically requested.
CONF_110	The coding shall complies with the following rules …	Query		Code is commented in significant detail and C++ method and variable names are chosen to be self-explanatory. To comment each subroutine as stated is impractical and counter-productive, as much of the code is generated by the Visual Studio designer via a GUI. We believe that the code is sufficiently commented and structured such that it may be maintained by programmers versed in the Visual Studio development environment.

DOC_010	Each document shall be uniquely identified. The following attributes shall be reported as a minimum: document identification, version, title, issue date, status, and document category.	Agreed		
DOC_020	Each document shall be provided signed in .pdf format (unalterable format) in addition to the native format .doc (for future update).	OK		Source documents are provided in .rtf format for greater portability.
DOC_030	All documents shall be written in English.	OK		With pleasure …
DOC_040	The following documents shall be delivered to CNES: - Schedule - Conformity Matrix - Software Specification Document - Design Documents - Configuration Description File - Installation and User Manual - Acceptance Test Plan	Agreed		Documents provided: • Schedule: n/a • Conformity Matrix: PsyPhy-GripMMI-ConformityMatrix-V1.1.0 • Software Specification Document: n/a • Design Documents: https://github.com/PsyPhy/GripGroundMonitorClient/wiki • Configuration Description File: GripMMI VC++ 2010 Express Configuration Notes • Installation and User Manual: GripMMI Generation and Installation Instructions • Acceptance Test Plan: *covered by CADMOS procedure*