

Multimission Ground Systems and Services

RAVEN Software Requirements

Software Requirements Document

Document Change Log

| Revision | Issue Date  (mm-dd-yyyy) | Affected Sections or Pages | Change Summary |
| --- | --- | --- | --- |
| Initial | 08-20-2015 | All | Initial issue of document. |
| A | 12-17-2015 | Fig.1, Sec. 4.1, 4.3 and 5.3 | Updated Figure 1 image to just RAVEN and its interfaces. Changed requirement numbers 1-9 to 01-09; Added requirements MW-31, 32, 33 and 34. Removed Figure 2. Cleaned up wording on 95% of the requirements based on Seung Chung’s review comments. |
| B | 06-07-2016 | 2.2, 2.3, 3.1, 4.1, 4.2, 4.3, 4.5. App-A, App-B, App-C | Added new requirements for SEQ 34.1.0 release (MW-25a, 25b, 25c, 25d, 07a, 07b, 50, 51) Rev A review comments from Mike Pajevski, and improved formatting |
| C | 08-24-2016 | Sec. 4.3, 4.4 & App. B | 1) Changed all references of “MPS Web” to “RAVEN”  2) Added new requirements MW-52 – 58  3) Added new section 4.4 |
| D | 11-03-2016 | Sec. 4.3 & App. B | Added new requirements MW-59 and MW-60 |
| E | 01-30-2017 | Sec. 4.2 & 4.4 | Added new requirement MW63.  Changed requirements verbiage to represent the capability. Created Epics MPSCORE-10053, MPSCORE-10054, MPSCORE-10055  Cleaned up wording and requirements.  Deleted redundant requirements.  Removed MW-07, MW-17, since they are features of requirement MW-49  Reworded MW-20 and moved to front of section.  Removed MW-27 since it is a feature of MW-59. |
| 03-10-2017 | Sec. 4.1,  Sec. 2.1, Sec 2.3, | Added new requirement for annotations MW-68  Removed MW-25x items since they are not requirements.  Consolidated plotting requirements sections with charts and views.  Reworded product perspective and assumptions.  Removed MW-20, MW-16, MW-50, MW-43 since these are not requirements, but acceptance criteria of MW-64, MW-65 and MW-66.  Removed lower limit for MW-05 |
| 08-09-2017 | All Sections | Modified wording to reflect rationales and not design.  Removed MW-35 and MW-36 since these were not requirements for OS X and Windows, only Linux.  Changed rationale MW-11 to reflect true rationale and not design.  Changed version to 34.5.0. |

Table of Contents

1 Document Overview 5

1.1 Identification 5

1.2 Purpose 5

1.3 Handling and Control 5

1.4 Scope 5

1.5 References 5

1.6 Overview 6

1.7 Definitions, Acronyms, and Abbreviations 7

2 General Description 7

2.1 Product perspective 7

2.2 Operating Environment 7

2.3 Assumptions and Constraints 8

3 General Requirements 9

3.1 Platform Requirements 9

4 Functional Requirements 10

4.1 Charts & Views 10

4.2 Data Management 13

4.3 Security Requirements 14

5 Non-Functional Requirements 14

5.1 Performance Requirements 14

Requirements Trace 16

Acronyms and Abbreviations 17

# Document Overview

## Identification

| Property | Value |
| --- | --- |
| Program Set | SEQ |
| Version | V34.5.0 |
| Release Date | 08/31/2017 |
| Released Component | 621.712 RAVEN |

## Purpose

The purpose of this document is to identify the Level 5 software requirements for the RAVEN (Resource and Activity Visualization Engine) application maintained under the Mission Planning, Sequence and Analysis (MPSA) element of the Multimission Ground System and Services (MGSS) Program and provided as part of the SEQ subsystem of the Advance Multimission Operations System (AMMOS). Rationales for the requirements and tracing to MPSA Level 4 requirements are provided.

## Handling and Control

This requirements document is maintained in the MGSS Data Management System (DMS) at <http://mgss.jpl.nasa.gov/dms/> and controlled by the MPSA change process documented in the MPS Software Management Plan (SMP) and MGSS Document Structure, Standards, and Definitions document. The [MPSCORE Jira (https://jira1.jpl.nasa.gov:8443/browse/MPSCORE)](https://jira1.jpl.nasa.gov:8443/browse/MPSCORE) also maintains a copy of the requirements along with all software related issues.

## Scope

The scope of the document is to specify functional requirements and related constraints of the RAVEN component. Detailed software functionality is addressed in the RAVEN Software Design Document. In this requirement document:

1. The word "shall" implies a required function that is verifiable.

2. The word "should" implies an optional but desirable function.

3. The word "may" implies an optional function.

4. The words "will", "is", "are" are used for statement and do not represent a requirement.

## References

Table 1: Applicable JPL Rules documents

| Title | DocID | | Revision |
| --- | --- | --- | --- |
| Documentation Management | | 78420 |  |
| End Item Data Packages | | 78120 | 2 |
| Software Development | | 57653 | 9 |
| Intellectual Property Reporting and Licensing | | 56592 | 4 |

Table 2: Applicable MGSS documents

| Title | Document Number | Revision |
| --- | --- | --- |
| MPSServer Web Services SIS | DOC-001472 | E |
| MPSServer User’s Guide | DOC-000838 | E |
| RAVEN Software Design Document | DOC-001519 | C |
| SEQGEN XMLRPC/REST Software Interface Specification (SIS) | DOC-000422 | G |
| AMMOS L4 Mission Planning and Sequencing Subsystem Functional Requirements Document | DOC-000040 |  |
| Mission Planning and Sequencing Software Management Plan (SMP) | DOC-000178 |  |
| MGSS Document Structure, Standards, and Definitions | DOC-000016 | D |
| MGSS Maintenance and Implementation Task Requirements (MIMTaR) | DOC-001455 | B |

## Overview

The RAVEN component is a web-based application that allows users to view data such as spacecraft activities, resource usage and predicted data, displayed via web browser.  Data can be imported from various project repositories and file systems and viewed simultaneously by distributed teams in order to collaborate while creating, analyzing, updating and validating activity plans and command sequences.

RAVEN can display any time-tagged data resource provided in Comma Separated Value (CSV) or JSON format with the MPS schema defined in the MPSServer Web Services SIS. Requests to retrieve data and represent it in a timeline style is made from the RAVEN application to the MPSServer where specific web-services APIs are used to interface with mission defined data sources and active software processes.

## Definitions, Acronyms, and Abbreviations

Definitions, acronyms and abbreviations can be found in **Appendix B**. Definition of RAVEN terms used in this document are listed below:

**RAVEN Terms:**

* **Activity -**In the RAVEN context, it is used generically to indicate display elements such as activities, sequences, commands, and events.
* ***Element***- item displayed on a timeline.
* **Data Source**– A source from where the data to be displayed is located.  A repository containing data files, a database or a running process such as SEQGEN.
* **Performance** - Performance address how well a system functions. Performance requirements are usually measurable.  They include speed of response, completion of a task, accuracy or precision of results in the intended environment, availability, capacity, recovery time, peak and sustainable speed, throughput, and volume requirements.
* **Resource** - A consumable or state value of an element on the ground or on a spacecraft.
* **System** - A system is a collection of hardware, software, people, facilities, and procedures organized to accomplish a set of common objectives. A system may be composed of other systems.
* **Time Range** - Continuous set of time described inclusively by a starting time and an ending time. This helps manage to limit the focus when working with large data sets.

# General Description

## Product perspective

RAVEN’s goals are:

* Provide flexible and efficient ways to retrieve and visualize stored data via a time oriented application.
* Access to a data store provided by the project via APIs.
* Render time-tagged data from MPSA, AMPCS and Project sources.
* Provide a component that runs in different platforms and browsers.
* Separate presentation layer (GUI) from services and logic, where RAVEN is an expert in charting, when given data in JSON or CSV formats.
* Display real-time situational awareness

## Operating Environment

It is expected that this component is independent of the operating environment by running as a web application in a browser. Currently RAVEN has been tested and validated in Google’s Chrome and Mozilla Firefox. As the development and testing team validate other browsers, they will be added to this list.

## Assumptions and Constraints

These requirements make the following assumptions:

* The project or user working with RAVEN will provide the data and databases via API requests.

# General Requirements

## Platform Requirements

|  |  |
| --- | --- |
| Req. ID: | MW-30 |
| Requirement: | RAVEN shall operate on the RedHat Linux Enterprise operating system |
| Rationale: | RHEL is the only operating system officially supported by AMMOS. |
| Verification Method: | Visual Inspection (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-8497 |

# Functional Requirements

## Charts & Views

|  |  |
| --- | --- |
| Req. ID: | MW-64 |
| Requirement: | RAVEN shall display activities, sequences, commands, and events (hereafter referred to collectively as "plan elements") with start times and end times on a timeline. |
| Rationale: | Users need to be able to see data in the correct display for them to have visual relationships to understand the readings. |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-8173 |

|  |  |
| --- | --- |
| Req. ID: | MW-65 |
| Requirement: | RAVEN shall plot sets of numerical values, each associated with a time. |
| Rationale: | Users need to be able to see data in relationship to time to understand the progression of a task or activity. |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-8111 |

|  |  |
| --- | --- |
| Req. ID: | MW-66 |
| Requirement: | RAVEN shall display sets of string values, each associated with a time. |
| Rationale: | Users need to be able to associate values with time to understand the events happening in a certain order. |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-10053 |

|  |  |
| --- | --- |
| Req. ID: | MW-09 |
| Requirement: | RAVEN shall provide an interface for remote access through a web browser. |
| Rationale: | An application compatible with different browsers the flexibility to run on multiple platforms, without configuration specific to each environment, since the browser does it for us. |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-8019 |

|  |  |
| --- | --- |
| Req. ID: | MW-10 |
| Requirement: | RAVEN shall provide a copyright statement that may be viewed by the user |
| Rationale: | In accordance with JPL Rules requirement in DoCID-56592Intellectual Property Reporting and Licensing, Rev. 4, released Dec 04, 2013 |
| Verification Method: | Visual Inspection (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-8044 |

|  |  |
| --- | --- |
| Req. ID: | MW-27 |
| Requirement: | RAVEN shall filter data sources based on user input |
| Rationale: | Data source lists can grow to be very large so users need the ability to limit the size of the selection list via a filter so they can focus on the data sources they want to plot. |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-8348 |

|  |  |
| --- | --- |
| Req. ID: | MW-34 |
| Requirement: | RAVEN shall manage display configurations. |
| Rationale: | Users need to store, retrieve, and to exchange configurations. This improves collaboration among external teams by allowing all users to view plans/data in the same layout. |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-8709 |

|  |  |
| --- | --- |
| Req. ID: | MW-48 |
| Requirement: | RAVEN shall display an indicator that represents current time |
| Rationale: | Users of RAVEN in operations needs to see an indication of the current time in comparison to the planned sequence activities so they know when activities are happening in realtime. |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-8789 |

|  |  |
| --- | --- |
| Req. ID: | MW-60 |
| Requirement: | RAVEN shall display an ITAR Marking Language |
| Rationale: | According to the Export Control, Rev. 6 document, in Section 6.1, “JPL employees and resident affiliates shall be responsible for safeguarding export controlled information from disclosure orally or visually, or transferring export-controlled items or information to a foreign person inside or outside the U.S. without proper authorization.” |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-9642 |

|  |  |
| --- | --- |
| Req. ID: | MW-68 |
| Requirement: | RAVEN shall display user-supplied annotations associated with timeline elements. |
| Rationale: | Users need to be able to provide mission planning with annotated data so that they are informed. |
| Verification Method: | Test (Test Case Name can be found in Jira):  Add/remove/edit annotation in the web application. Visually validate changes in the UI. |
| Jira ID: | MPSCORE-10000 |

|  |  |
| --- | --- |
| Req. ID: | MW-46 |
| Requirement: | RAVEN shall change the displayed time to show the format specified by the user. |
| Rationale: | Mars missions’ users require visualization of activities and resources in Mars time |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-8735 |

|  |  |
| --- | --- |
| Req. ID: | MW-63 |
| Requirement: | RAVEN shall export timelines using the interfaces defined in the MPSServer SIS DOC-001472 Rev E. |
| Rationale: | User require the ability to pick which timelines they would like to export and then choose a format for the exported data (CSV or JSON for example). |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-9389 |

|  |  |
| --- | --- |
| Req. ID: | MW-67 |
| Requirement: | RAVEN shall temporally align the information displayed in all rows |
| Rationale: | Users need to be able to arrange any number of data rows in a chart for ease of validation, analysis and comparison. By aligning the information temporally, the user can add context for occurrence in events in a time line in relationship to others. |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | No Jira ticket created for this item in particular. |

## Data Management

User’s require the ability to manage and organize their data within a data repository. The following requirements address the needs for particular capabilities that will provide the user options for organizing and managing their data.

|  |  |
| --- | --- |
| Req. ID: | MW-53 |
| Requirement: | RAVEN shall configure the structure of data in a user-selected database. |
| Rationale: | User’s require the ability to manage and organize their data within a data repository. A ‘folder’, as in a standard operating system file system is equivalent to the namespace in a data repository. It is easier for user to associate “folders” as organization containers instead of ‘namespaces’. |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-10056 |

|  |  |
| --- | --- |
| Req. ID: | MW-01 |
| Requirement: | RAVEN shall retrieve data to be displayed from one or more user-selected databases. |
| Rationale: | Users need to look at a variety of data and be able to select the source of data to view from |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-7939 |

## Security Requirements

|  |  |
| --- | --- |
| Req. ID: | MW-11 |
| Requirement: | RAVEN shall authenticate user permissions before allowing a user to access or to display any data, when the owner of that data requires authentication. |
| Rationale: | Sensitive information may be displayed to the wrong person without authentication. |
| Verification Method: | Visual Inspection (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-8062 |

|  |  |
| --- | --- |
| Req. ID: | MW-28 |
| Requirement: | RAVEN shall encrypt all communication with the server |
| Rationale: | To prevent critical data from being accessed from unauthorized users |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-8349 |

# Non-Functional Requirements

## Performance Requirements

|  |  |
| --- | --- |
| Req. ID: | MW-06 |
| Requirement: | RAVEN shall display 10,000 points for a single resource within 20 seconds |
| Rationale: | A minimum performance requirement is required to make the application more usable |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-8000 |

|  |  |
| --- | --- |
| Req. ID: | MW-05 |
| Requirement: | RAVEN shall display up to 100 rows of data simultaneously in the same chart when requested by the user |
| Rationale: | Users need to be able to arrange any number of data rows in a chart for ease of validation, analysis and comparison. |
| Verification Method: | Test (Test Case Name can be found in Jira) |
| Jira ID: | MPSCORE-7981 |

Requirements Trace

The following table identifies the L5 RAVEN requirements in numeric order and their trace back to the L4 MPS Subsystem and L3 AMMOS System requirements.

| L5 RAVEN Requirements | L4 MPS Subsystem Requirements | L3 AMMOS System Requirements |
| --- | --- | --- |
| MW-01 | Derived |  |
| MW-05 | Derived |  |
| MW-06 | Derived |  |
| MW-09 | MPS251 |  |
| MW-10 | Derived |  |
| MW-11 | Derived | L3 AMMOS1220 |
| MW-27 | Derived |  |
| MW-28 | Derived | L3 AMMOS1113 |
| MW-30 | MPS251, MPS306, MPS307 |  |
| MW-34 | Derived |  |
| MW-46 | Derived |  |
| MW-48 | Derived |  |
| MW-53 | Derived |  |
| MW-60 | Derived |  |
| MW-63 | Derived |  |
| MW-64 | Derived |  |
| MW-65 | Derived |  |
| MW-66 | Derived |  |
| MW-67 | Derived |  |
| MW-68 | Derived |  |

Acronyms and Abbreviations

| **Acronym or Abbreviation** | **Definition** |
| --- | --- |
| AMMOS | Advanced Multimission Operations System |
| API | Application Program Interface |
| CAM | Common Access Manager |
| CSV | Comma Separated Value |
| DMS | Document Management System |
| EVR | Event Record |
| JSON | JavaScript Object Notation |
| MGSS | Multimission Ground System & Services |
| MPSA | Mission Planning, Sequencing and Analysis |
| MPSServer | Mission Planning & Sequencing Server |
| PEF | Predicted Events File |
| RAVEN | Resource and Activity Visualization Engine |
| SEQ | Sequencing |
| SIS | Software Interface Specification |
| TOL | Time-Ordered Listing |
| XML | Extensible Markup Language |