COMMON DISPLAY SYSTEM (CDS) AT THE NAVAIRWD RANGES

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ABSTRACT

The Common Display System (CDS) will provide all NAVAIRWD sites with a flexible Range real-time situational awareness and telemetry display/processing capability. CDS will have an extensible framework enabling all sites to quickly and conveniently develop Range unique plug-ins to accommodate new requirements or functionality not presently found in the applications common core plug-ins. Range unique plug-ins are separate and distinct from the application's common core engine.

KEYWORDS

Real-time, Situational Awareness, Telemetry, Display.

PURPOSE

This paper provides an introduction to the NAVAIRWD Common Display System (CDS) project. Areas addressed include: project background, objectives, intended users, conceptual overview, and the development approach.

INTRODUCTION

CDS will provide all NAVAIRWD sites with a flexible Range real-time situational awareness, telemetry display and data processing capability. CDS has an extensible framework enabling all sites to quickly and conveniently develop site unique plug-ins to accommodate new requirements or functionality not found in the applications common core. Range unique plug-ins are separate and distinct from the application's common core engine. The core components are comprised of the software required to operate the basic platform (execute the program) and to load non-core components. These software routines can be implemented as static or dynamic linked entities. Core components can operate by themselves but will not perform any useful data acquisition, processing, or display functions. Core components of CDS are: Data Manager, Display Object

Manager, User Interface Manager, Coordinate conversion routines. The system is intended for use by: Range personnel (Including Range Safety) to ensure safe execution of real-time test events, Sensor operators, Telemetry and, Project Engineers, Test conductors, Data Analysts and others requiring such capabilities. CDS will be deployed to Operation Control Rooms (OCRs), Test Bays, Data Centers and other real-time operational environments that require a situational awareness display system.

BACKGROUND

Range Data Systems Division (RDS) of the NAVAIRWD Ranges at China Lake and Point Mugu, California have an ongoing project within their organization titled Common Display System (CDS). One objective of this project was to form a cross-site team that focused on the pursuit of complementary goals in the design, development and implementation of a universal range display system utilizing a common core engine combined with application specific plug-ins tailored for each Range. The entire application suite is compiled from a single set of source files under central configuration management (CM) control. End-users can compile and link customized plug-ins into the core engine without the need for the original core-engine source code. The NAVAIRWD CDS project leverages from the lessons learned and intellectual capital derived from an earlier NAVAIRWD project that produced a working prototype system, RangeView for the Land Range, China Lake site. RangeView (RangeView version 4.0.1.386) not only provides functionality but served as a valuable tool used in the CDS requirements elicitation process.

APPROACH

The Common Display System (CDS) project follows a spiral development approach. Current planning entails eight spirals, each segregated into a series of incremental builds. Requirements captured in the Common Display System (CDS) Requirements document were mapped to one of the planned development spirals. The CDS project leverages from an earlier software development effort that is highlighted in the background section of this document. Each CDS spiral provides integrated functionality that represents a functional capability release. When fully implemented CDS will enable the replacement of multiple legacy display and processing systems (Telemetry - TM & Time, Space, Position Information - TSPI) presently in use at each of the three NAVAIRWD Ranges.

SYSTEM DESIGN

CDS will support a core functionality that can be extensible at run time via software plug-ins. These software plug-ins will allow for the development of new capabilities such as: display item components, map features, control functions, computational schemes, and data sources. Providing an extensible framework while standardizing the CDS core software architecture enables a wide range of users to be accommodated with a single software solution. Figure 1 is a high level conceptual view of the CDS software architecture and Table 1 defines each element.

FIGURE 1 - HIGH LEVEL CONCEPTUAL VIEW

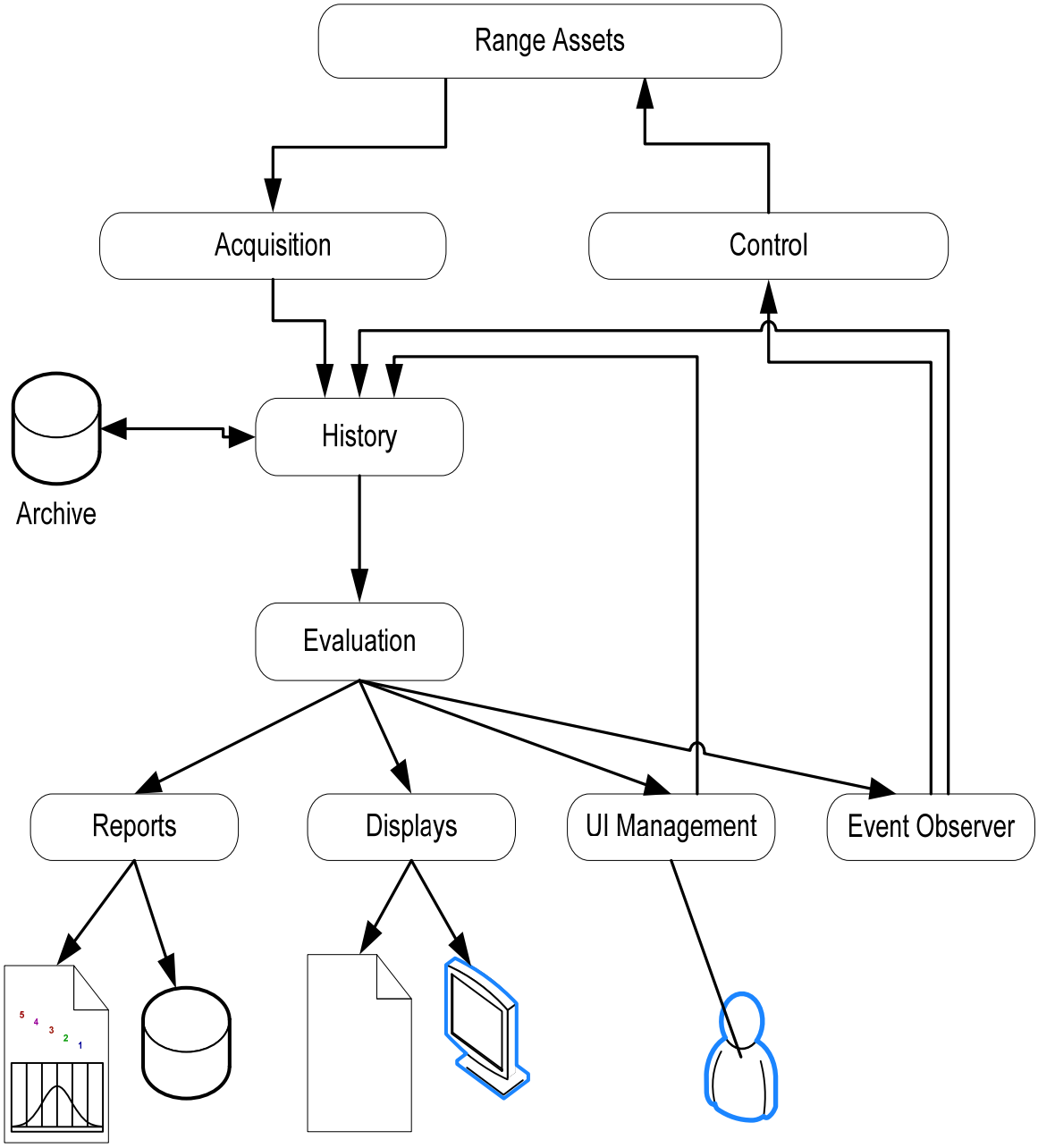


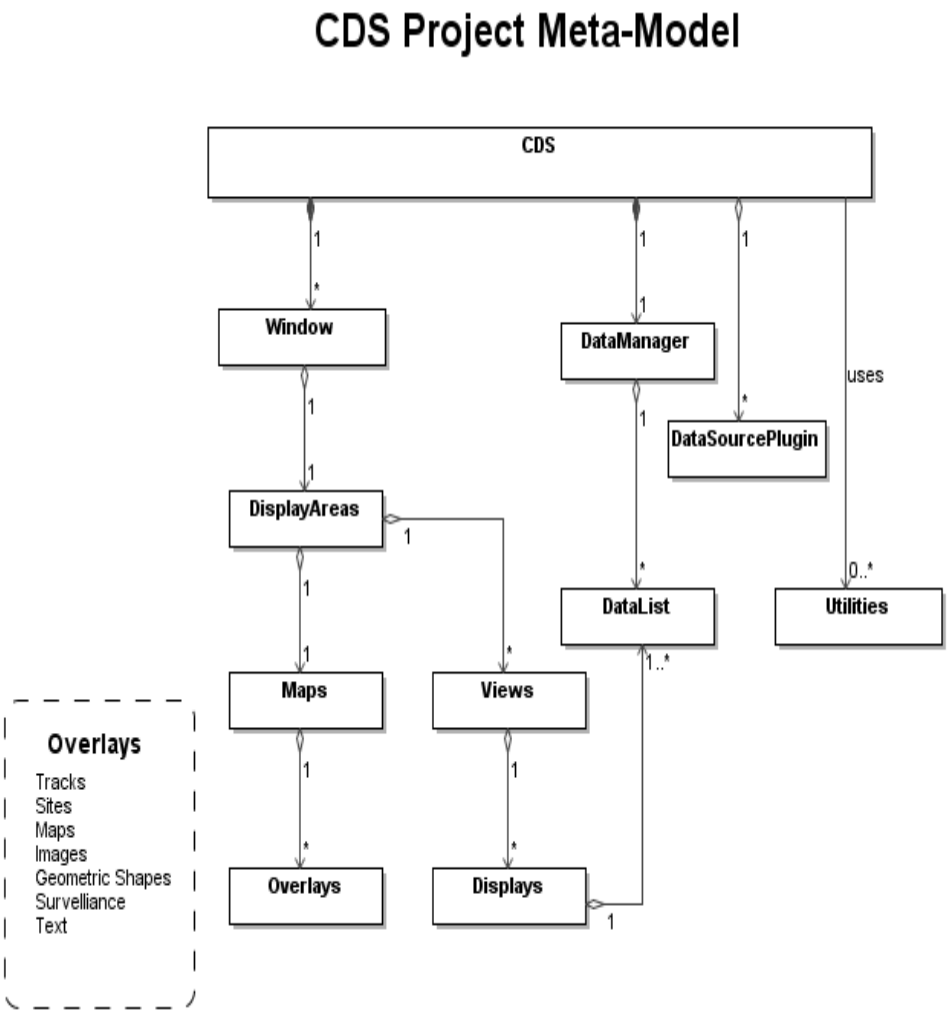
TABLE 1

Range Assets	Logical devices that make up the range. These include various types of instrumentation and sensors such as: radars, GPS units, telemetry systems, video and audio sources. Devices provide digital data and may or may not allow for digital control.
Acquisition	Communicates with range assets to obtain time-tagged binary data.
Control	Communicates information back to range assets. This information may include location of targets, switch information, or other data as appropriate.
History	Accepts data from the acquisition system and adds that data to a database of time-tagged data for later retrieval. The history system is responsible for archiving data for later retrieval. It is also integral to playback of the data.
Archives Evaluation	Data stored on media such as: CD, DVD, disk or Network Attached Storage (NAS). Decodes data provided by the acquisition subsystem into a form usable by consumers of data located elsewhere in the software. The general model is that a consumer requests a piece of data at a given time and the evaluation subsystem works with the history subsystem to retrieve and decode and provide that data into the desired form.
Reports	The final output of the system. Reports may take the form of printed information or report files (binary or text).
Displays	Presents data from the range assets for a given time. Displays may be in the form of video-based strip charts, maps, dials, and gauges. Displayed screen(s) may be printed at any time.
User Interface (UI) Management	Communicates with the user and decodes user inputs into meaningful system commands (some of which may be communicated to the range assets). This subsystem is also responsible for determining which items are available to the user. For example, a user account with limited access privileges will not have access to all control features of the system. It also allows operators to generate event markers and notes which are placed into the data stream for archiving.
Event Observer	Monitors the incoming data stream and allows for actions to automatically be taken on particular combinations of data. For example, a screen print may be generated when a signal exceeds a certain level or positions communicated to range assets on a regular basis.

SOFTWARE

CDS will be designed employing object-oriented methodologies. To simplify maintenance and modification, all display, filtering, computational, and communications modules will be structured as components that interface to a common core architecture. Components will be based upon Dynamically Linked Libraries (DLL) or a similar technology that permits the insertion of new objects without recompiling the entire CDS core software application. Program modules will be documented and include class diagrams depicting the overall structure of the system. Figure 2 is the CDS Meta-Model.

FIGURE 2



SUMMARY

CDS version 2.1.1 released in April 2009 was the result of development spiral 2. The completion of CDS development spiral 2 resulted in approximately fifty-percent of the original defined baseline requirements being satisified. Release 2.1.1 provided support for telemetry displays, surveillance displays, time, space, position information (TSPI) displays, Range map displays, digital strip charts, data archiving and customer replay capability, all in a 2D environment with some 3D capability. CDS development spiral 3 is underway and will incorporate multi-window functionality, enhanced track management, an Instantaneous Impact Predication (IIP) algorithm, and expanded 3D functionality. The release resulting from CDS development spiral 3 is planned for the fall of 2009.

ACKNOWLEDGEMENT

We acknowledge the contributions of all CDS team members and subject matter experts past and present. It is due to their hard work and dedication that the vision presented on bar napkins and dry erase boards years ago is now being realized.