3 Reasons Why the Missile Defense Agency Wants FishEye's Pelagic

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MDA Looking for a New Approach to Lowering Costs and Risks

The Missile Defense Agency (MDA) is "committed to maximizing the mission assurance and cost effectiveness of our management and operations through continuous process improvement."[i] In a technical evaluation, MDA specifically highlighted FishEye's Real-time Tool Kit as a key success factor in analysis support, earning an Outstanding Rating. In the evaluation, MDA identified 3 reasons why MDA wants FishEye's Pelagic[ii] product:

1. Reducing Analysis Timeline
2. Reducing Data Reduction Complexity
3. Simplifying Data Analysis

Complex Real-Time Systems Inherent Data Challenges

The Missile Defense Agency (MDA) develops, tests, and fields an integrated ballistic missile defense system. The system is comprised of computers and sensors working together to hit a missile with another missile traveling 17,000 MPH. Subsystems work in concert with fast, hard deadlines and generate large volumes, at high velocity, in a broad variety of data formats to detect & track missiles and verify success. Sensors collect data at a velocity of gigabits per second and must analyze and distribute huge volumes of data in real-time. The system comprises multigenerational hardware from different vendors, utilizing a variety of non-standard data formats that must be translated in real-time. All these elements make an inherently challenging data environment.

Traditional Approaches Add Unintentional Costs and Risks

Time and again, real-time data processing and analysis for complex systems have been handled using traditional internet and information technology. In one approach, data is converted into platform-independent formats, such as Java, JSON, ASCII text, or XML. Using these "Internet-like" or "enterprise data" approaches provides portability between computing platforms, but comes at a cost of substantial real-time processing, slower response times, and increased storage consumption.

This approach is not aligned with the needs of time-critical real-time systems. In a second traditional approach, data is stored directly on the host computing platform and then post-processed to migrate the data to different computing platforms and extract meaning. In this "post-processing" approach, data can be stored efficiently, but it complicates the downstream use of the data by requiring project-specific, software-version-specific, and platform-specific post-processing tools. These tools must be kept in sync with the data as they are distributed to the data-consuming community. This approach requires additional expense and time to post-process and typically requires access to specific mission-critical computing resources. While traditional internet and commercial approaches initially sound like an easy solution to sharing, analyzing, and managing complex system data, they constrain system performance and add significant and pervasive costs and risks.

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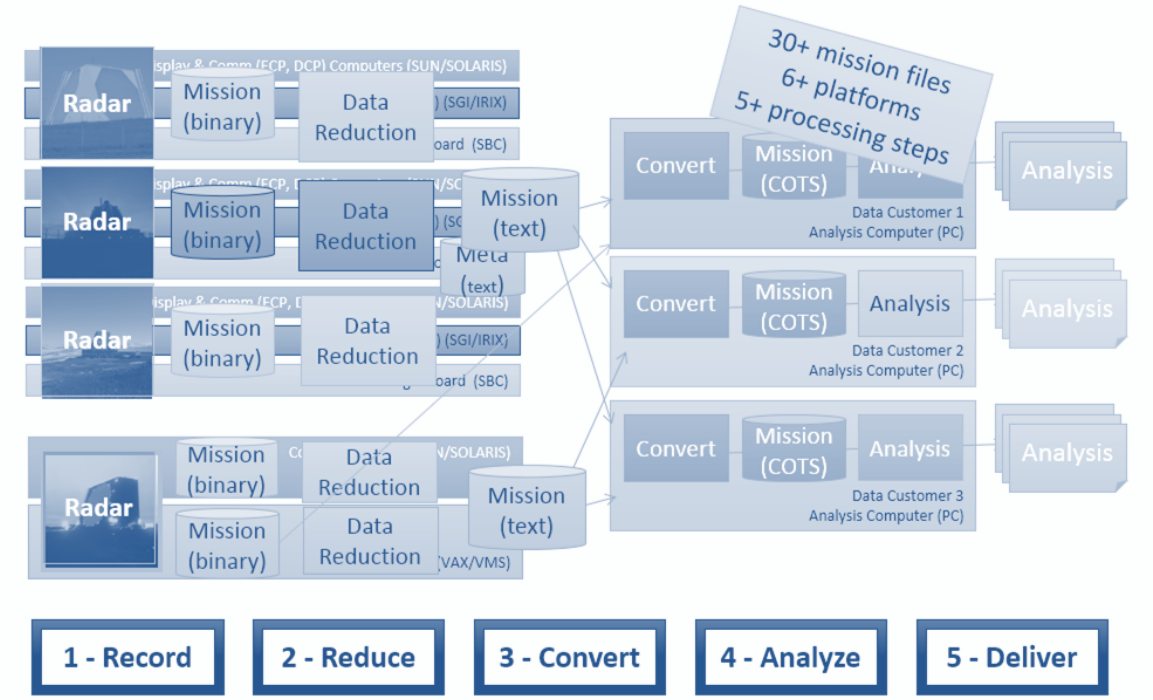
Hidden Complexity in a Multi-Sensor Example

You can imagine that missile defense systems are sophisticated systems. Figure 1 below illustrates the "Test & Evaluation" data flow of a system with four radar sensors. In this example, there are two radar types running on six different platforms (computing hardware and operating systems). The data and tools are platform-specific. These radars all use the traditional post-processing approach.

Figure 1 - The Variety of Systems, Volume of Technical Data, and High Velocity of Complex Missile Defense Systems make Data Processing and Analysis Challenging.



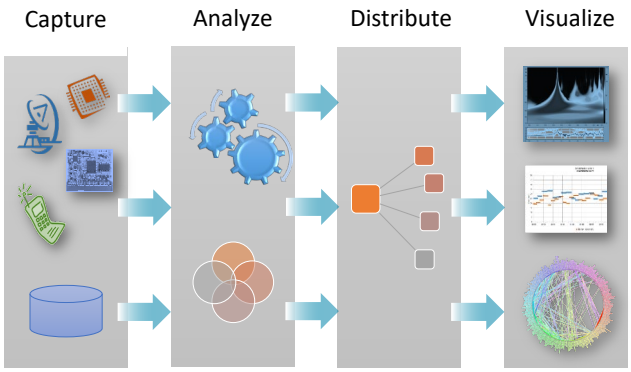
This system is continuously tested in a simulated environment. A test that takes one hour to run typically requires 3 to 4 hours of post-processing and analysis to validate that the test was viable. The results and data are shared with five or more distinct organizations that use three different types of software tools to process and further analyze the test results. This example system requires test data from 6 different computing platforms and is stored in over 30 mission files. Each time a test is performed, a team of analysts uses a series of tools in a 5-step process to convert the real-time binary data into a format that can be analyzed. The process is complex, expensive, and slow, requiring elaborate configuration of mission software, analysis tools, and data archives. The process is time-consuming and expensive, generating unwieldy large files. This process is continuous, labor-intensive, and supported by five or more distinct organizations, resulting in a significant, hidden, and unnecessary burden of cost and time. This traditional "post-processing" approach is manual and slow, thereby slowing the development and validation of the system, which adds costs and risk. In general, the approach does not operate at the caliber of an otherwise sophisticated system.

Rethinking Complex System Data Processing and Analysis

Since 1997, FishEye has been developing, integrating, and testing software for real-time systems. During this time, we wondered why, in this era, data processing and analysis were still such a challenge. It seemed there should be a better way, and in 2009, we began to rethink the entire process. How could complex real-time systems better access, assess, and fuse information without burdening the ecosystems they serve? Through the process, FishEye developed a solution in a software platform called Pelagic. The technology implemented an innovative approach to capture, analyze, distribute, and visualize streaming machine data seamlessly across complex heterogeneous environments. The resulting technology includes these elements:

- **Streaming Capture -** Streaming real-time machine data capture, portable across computing platforms
- **Streaming Analysis -** Streaming real-time analysis, instead of post-run batch
- **Streaming Distribution -** Selectively move real-time data seamlessly between heterogeneous computers and sensors to enable data fusion, forensics, modeling, and simulation
- **Streaming Visualization -** See insight and understand systems in real-time

Figure 2 – FishEye's Pelagic Streamlines Capture, Analysis, Distribution and Insight if Complex System Data in Real-Time



FishEye's Pelagic enables existing and emerging real-time systems to harness massive data velocity, volume, and variety. Pelagic maintains state-of-the-art real-time performance while relieving traditional downstream post-processing and analysis burdens. The technology eliminates data processing, streamlines analysis to real-time, and optimizes data management, thereby reducing development, research, operational, and maintenance costs and risks associated with complex real-time systems.

A $267M Annual Impact on Missile Defense by Streamlining Data

Implementing a new approach to capturing, managing, distributing, and analyzing data from complex systems has a significant impact. MDA's 2015 budget for Construction (MILCON), Operation & Maintenance (O&M), System Development (Procurement), and Research Development Test & Evaluation (RDT&E) averages $7.65B per year over the next five years. Reviewing the program plan, 97.7% of the programs and their associated budget are affected by complex system data processing and analysis challenges. All but the Construction budget line are impacted by five challenge areas.

1. Reporting of Multi-System Data
2. Data Conversion Processing
3. Run-Reduce-Repeat Analysis
4. Redundant Analysis Tool Development
5. Data Conversion Tool Development

Using past program experience and the relative complexity, a model was developed to calculate an estimate of the impact of data processing and analysis on a development project budget, as well as the equivalent value of project risk reduced. This model was used to extrapolate the impact for O&M and RDT&E projects. This impact model was weighted by the impact of the challenge areas against each of the four budget areas (see Table 1). Figure 3 below shows the total impact of $1.3B over the next 5 years of MDA's budget.

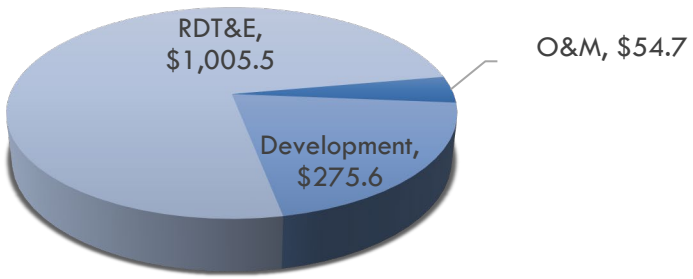
$267.8M annual impact to MDA's budget from the hidden and pervasive annual costs from complex missile defense system data processing and analysis.

Source: MDA Preliminary Budget 2015 Appropriations Summary applied to project impact model. May 21, 2014

Table 1 – Impact of Challenge Areas on Project Cost and Risk

Program Type	Cost or Risk Reduction Impact
Construction	0.00%
O&M	2.50%
Development	3.20%
RDT&E	3.95%

Figure 3 - MDA 5 Year Budget Impact 2015-19 ($M USD) from Complex Data Processing and Analysis



How to Take Steps to Reduce Costs and Risks of Complex Systems Data Management and Analysis?

Pelagic offers a cost-effective and rapid method for simplifying the management and analysis of complex system data. If your system is burdened by post-processing, lacks ease of access to detailed system data, or is slow to produce analysis results, find out ways you can adopt real-time streaming capture, analysis, distribution, and visualization. FishEye is seeking to partner with government agencies, system developers, and integrators to transform the way real-time system data is managed and analyzed. Contact FishEye to explore how we can collaborate to reduce the costs and risks associated with new and existing systems.

About Fisheye Software

After spending more than a decade designing, integrating, and testing radars and command and control systems, FishEye has identified the challenges associated with developing large, real-time systems. While the tasks performed by these systems varied widely, they all shared real-time requirements and the ability to extract internal data for subsequent analysis. FishEye is actively exercising and evolving Pelagic's capabilities for customers in the U.S. Navy, Missile Defense Agency, and Air Force.

FishEye Software provides software and services dedicated to software systems development, integration, and testing in the real-time defense and commercial communities. Since 1998, the company has been delivering mission-critical and operational software for air traffic, missile defense, and command and control systems.

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[i] http://www.MDA.mil/about/

[ii] The Pelagic product has been rebranded from the Real-Time Tool Kit or RTTK.

Call or Email to Meet or Learn More

To schedule a meeting to learn more or discuss how your system can realize the Pelagic benefits, contact Ted.Selig@FishEyeSoftware.com or 800-513-0881

http://www.FishEyeSoftware.com/Pelagic